





COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF AGRICULTURE

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BULETIN No. 219

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# Increasing the Winter Yield of Eggs

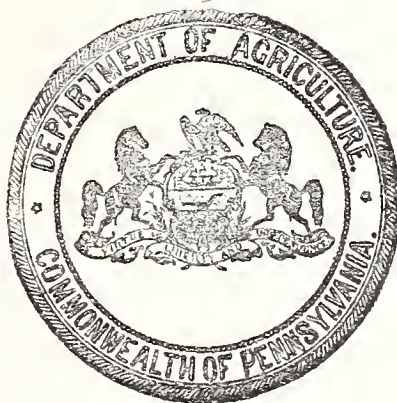
By W. THEO. WITTMAN  
ALLENTOWN, PA.

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## PREFACE

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Department of Agriculture,  
Harrisburg, Pa., February 19, 1912.

The unprecedented advance made in the price of all poultry products within the last eighteen months and the resulting inquiry for the best methods of breeding, housing, feeding and otherwise caring for domestic fowls, are responsible for the publication of this bulletin.

A poultry bulletin was published by this Department for which there was great demand not only by our own people but calls for it came from all over the country, and although at the time of publication it was thought the edition was large enough to meet all demands, it was practically exhausted more than a year ago, while the call for poultry literature was increasing rather than growing less. To meet this demand, Mr. W. Theo. Wittman, a successful specialist in breeding and handling chickens for profit, was engaged to prepare the matter for this bulletin, and it is hoped that it may prove helpful to many who are seeking information along these lines.

N. B. CRITCHFIELD,  
*Secretary of Agriculture.*



## LETTER OF TRANSMITTAL

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Allentown, Pa., January 1, 1912.

Hon. N. B. Critchfield, Secretary of Agriculture:

Dear Sir: I have the honor herewith to submit to you a bulletin on "Increasing the Winter Yield of Eggs," that I believe to be not only timely but that will, I hope, prove of considerable value not only to the farmers of the State of Pennsylvania, but to many other of its citizens who, either from choice or compulsion, are residing in villages and towns.

Although the late United States census took no account of the poultry being kept by this latter class of people, there is no question but that an immense amount of poultry is being kept by them, and their interest in increasing the amount of eggs from the poultry they are keeping is very keen. Hence, it would seem to be unfair to entirely omit the wants and needs of this class.

The farm is now, and is likely to remain the one best place to produce, easily and economically, one of the great staple foods of the American consumer. And, yet, unfortunately, the farmers of our great State, in common with those of many other States, have not, as a rule, begun to give anything like the thoughtful and intelligent attention to poultry keeping and large egg production that they could have done or eventually are bound to give. As our civilization becomes more complex and our population denser, it is certain that the demand for and the use of the finer and more nutritious foods, like poultry and eggs, will continue to immensely increase. The already great increase in their consumption has produced a startling increase in prices, stimulating within the last year or two, an enormous increase of interest, oddly enough, beginning with the largest consumer of poultry products, the town and city people. This class has, within the period of time mentioned, spent more or less unwisely hundreds of thousands of dollars in the buying of schemes for city poultry keeping promising enormous profits.

And, while Pennsylvania, with its many farms, already ranks as a great poultry State, it is a most gratifying and encouraging sign of the likelihood that its poultry product may be shortly greatly increased, or that as a State it may sometime lead, by the fact that lately it has been the biggest buyer and importer of pure-bred poultry of any State in the Union. And if this bulletin, giving some honest, matter-of-fact information, may further stimulate interest in the correct practice and theory of poultry keeping, the writer will feel well repaid for the careful and painstaking labor put therein.

*Increasing the winter yield of eggs* to any large extent or to any permanent extent for any one producer or group of producers, means a complete and fundamental knowledge of poultry breeding, rearing, feeding, housing and keeping, and while a casual glance at the title

might not convey such an impression, this bulletin, designed to be as complete and valuable as possible, covers all these phases of poultry husbandry.

Finally, while an intelligent comprehension and carrying out in practice of the contents of the following pages will show, not only an increased yield of winter eggs, but the maximum yield usually possible, both winter and summer, the writer does not wish to lay any claim to a "system," nor to a get-rich-scheme, or to any knowledge not now well known to many wide-awake and successful poultry keepers and in practice by them. With the fullest realization of how much there is still to learn, thirty years spent among poultry and poultry people has convinced the writer that the greatest or most common error among people, newly or casually interested in poultry, is "knowing too much," and in "learning too fast," and in not sticking "to that which has proved to be good." That those reading this Bulletin may not fall into this error is the sincere wish of

Your obedient servant,

W. THEO. WITTMAN.



## INCREASING THE WINTER YIELD OF EGGS

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### INTRODUCTORY:

There is strong reason to suspect that most people harbor the idea that getting winter eggs or increasing the yield of same is merely a matter of feeding and feeds. And when they hear of anyone who is successful along the line of egg-getting, they take it as a foregone conclusion that the one thing this poultryman has learned is how to feed his hens "just right," or that even, perhaps, he has discovered some "secret" along feeding lines. Feed is a great factor, and occasionally for a year or two may be *the* factor in someone's large egg yield, but for any lasting, or real, or consistently continued large yield or gain *there are many things entering in besides feeding and feeds*. And to those only who will exert themselves to learn and to master the many things that go before, is success certain.

As winter is *the* season in which eggs sell at high prices, it is usually and naturally the first consideration that such poultry as is kept over during this season should lay well during that time, for winter eggs offer a promising and highly profitable source of income and, except under the forced or intensive methods necessary in village and town poultry keeping, many things that trend to increasing the winter yield of eggs will likewise trend towards increasing the summer and the annual yield.

The development of everything pertaining to country life within this State with the last decade has trended more and more towards making the farm a factory with a necessary output and an income for every month in the year.

The steady increasing consumption of eggs with the high prices of the last few winters, coupled with a better knowledge and understanding what constitutes sound, practical poultry keeping, has brought us to the time where it is entirely tenable to state *that poultry keeping as a business may be made an entirely safe and sane proposition*. It seems almost a national disgrace that this country, with its wide area, much of it highly suitable for poultry growing and keeping, should not be able to supply its own needs in the way of eggs but annually import not only from European countries, but Asiatic countries as well.

Pennsylvania by reason of its nearness to the best markets for eggs, by reason of its climate, soil and people should enormously increase its winter egg production, and is likely to do so in proportion to the rate it discovers that this can be done profitably.

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### BREEDING

#### WHAT GOOD BREEDING STANDS FOR:

Good breeding stands for the beginning of everything that may mean any possibility of further increasing the annual egg yield of our

domestic poultry. This strong statement is made in the face of the fact that some would deny that the productiveness of the hen can be increased by breeding. Is made too in spite of the fact that one notable instance at least can be cited where apparently continued breeding for increased egg production was a failure.

#### BREEDING POSSIBILITIES FOR INCREASING EGG PRODUCTION:

If breeding can so measurably increase production in various lines of animal and plant breeding, then why should poultry breeding for increased egg production be a notable exception? It is no exception. Poultry will, as one would naturally suppose, respond to breeding for this one thing. It has done so. In fact, breeding has lifted whole breeds and varieties until they are known for their distinctive laying qualities.

But, if one will foolishly take some representatives, we will say, of a laying breed, and by high or forced feeding make an egg record with them, it is silly to suppose that the next generation are going to show an increase, and the next in line yet again an increase,—by keeping up the forced feed. Such a method inevitably trends to deterioration; trends to burning out the vital forces and to sure failure.

On the other hand, we will suppose we find a hen, of a laying breed too, to make comparisons equal, that under normal or usual conditions of feed and keep is a superlatively heavy layer. And suppose, fortunately for us, besides this, she is a strongly prepotent hen or one able to strongly carry on in her chicks her unusual ability to produce eggs. By a line of breeding we may establish a laying family of hens with this one hen as the ancestral head.

That this family may eventually die out or be excelled by another family, is no proof whatever that by good breeding we may not attain to things not before existent or that we cannot hold on to what we have attained to. The wise breeder will reinforce his line whenever necessary or possible, doing it, however, with extreme conservatism and caution.

A good breeder, whether he be a poultry breeder, an animal breeder or a plant breeder, is, in a sense, a creator. He can hardly be a good poultry breeder without, in a measure, being a poultry "fancier," the same as a *good* farmer can hardly fail to be in some sense, a lover of nature. A man can be a *fancier* of poultry and never regularly exhibit any. And a short-sighted "for dollars only" poultry keeper is only spiting his own face and standing in his own light (his dollars and cents light) when he refuses to be or fails to be a fancier in the above sense.

#### WHAT BREEDS TO SELECT AND HOW TO SELECT:

For the farmer whose poultry has free range and whose place is surrounded with green lawns and fields, no breeds or varieties will suit him better than White Plymouth Rocks or White Wyandottes, or White Orpingtons, for these all belong in the general purpose class, or, they are good growers, are hardy, are good layers, are good table poultry and make good setters and mothers. Besides this, being all on color or self-colored, they are easy to breed to color or to a uniform flock and are showy above any other color with green fields for a background. For the village and town poultryman, wishing the same practical attributes for his poultry, these varieties or color are unsuitable, for with bare runs and oftentimes sooty atmosphere this





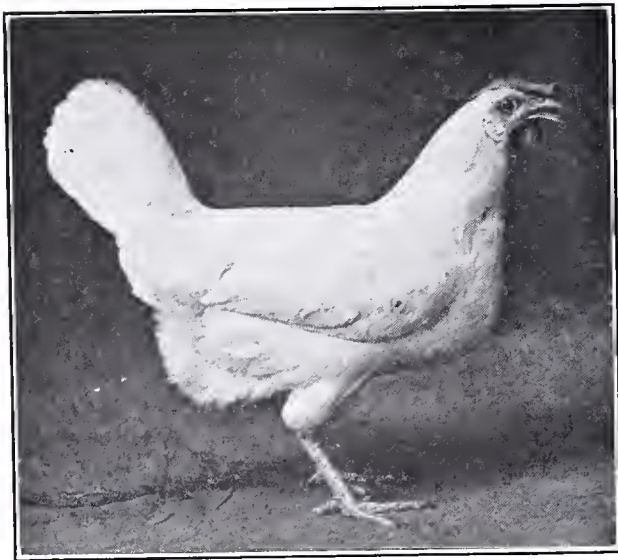


Fig.1. White Leghorns of the laying type, showing the wedge-shaped body with legs well apart, long back and long keel line showing full breast and prominent "egg basket." Eyes alert, comb large, and strong, medium large bodies without coarseness. It is very difficult to portray Leghorn character and type by means of the camera for, as a breed, they are both scary and restless.

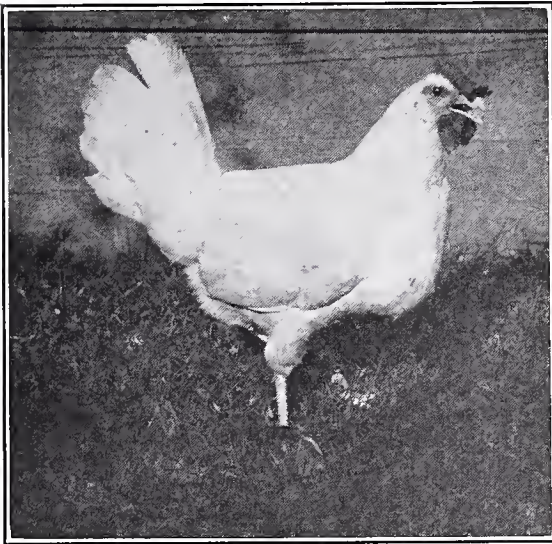
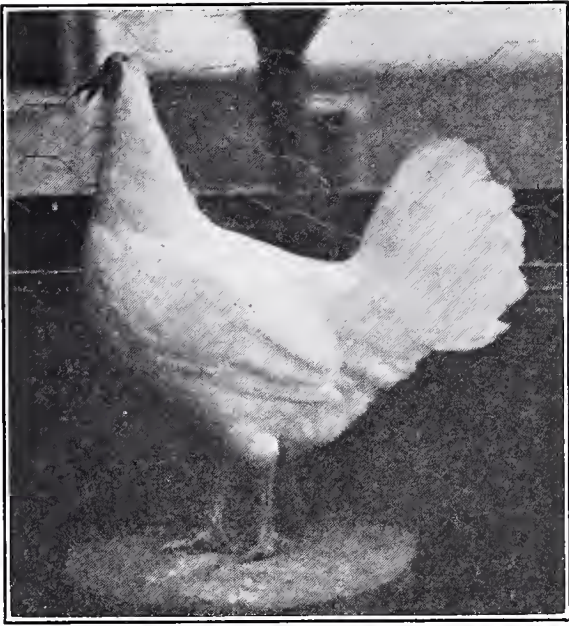


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color quickly becomes dirty and untidy looking. For him, Barred or Buff Plymouth Rocks, any of the colored Wyandottes or Black or Buff Orpingtons are more suitable. Also the flock, or number kept, not being so large, it will be easier to cull to color so as to have same even or uniform.

In this matter of selecting a breed, it must always be remembered that it is comparatively easy for the poultryman to make out of the American class, to which the Rocks, the Wyandottes and the Reds belong, whatever the owner wishes. Does he wish to make out of them a heavy laying strain of poultry? Then constant selection and breeding from and to the best layers will alter the type, reduce the weight or size, probably enlarge the comb and give him a fowl whose strongest attribute is an egg-laying capacity. Does he wish large killing chickens? Then constant selection and breeding from and to fowls that have made a strong and quick meat growth and attained large weight or size will give him a beef family or fowl.

For the man who wants eggs first, last and all the time, the White Leghorn is a variety already made and ready to hand for this specific purpose. But, as a word of caution, a Leghorn, to be profitable, wants Leghorn care, and I am not sure but what adult Leghorns kept for egg production are not better off than when always kept yarded. A good many farmers do not like Leghorns, and it must be admitted that they will dig things up, around a farm, quite persistently and amazingly. Where they can do no damage this great foraging capacity of the adult Leghorn may be turned to good account in the small amount of feed consumed at home; but to our mind, this saving is offset by the smaller number of eggs laid.

When selecting birds or stock or eggs for hatching, for egg production, the first thing of importance is to know that they are from an actual heavy laying strain. Some breeders will claim a "laying strain" when they have nothing of the kind. The second thing, and of supreme importance is, that the stock has been kept and treated to conserve vitality. The matter of breed or of variety or of color can then be the next consideration. But a prospective poultry-keeper, if he has any likes or dislikes as to varieties, should by all means consult these in his selection. As a further guide in this we now take up

#### THE LAYING BREEDS:

These breeds for this State really all come under what is known as the Mediterranean class. Of them all, the White Leghorn stands out prominently as the most meritorious and the most popular. (See Fig. 1). In the White Leghorn we have a variety easily bred true to color in large flocks; one that can always be depended on to lay a pure white-shelled egg; one that is usually a non-setter; one whose eggs will incubate easily; that is always active and sprightly and that will mature early, having made its growth on the minimum of feed and expense. That all White Leghorns or even all Leghorns are good layers is not true. An entire strain or family of any of the dozen or more varieties may be poor layers and to keep such breed for egg production is folly.

Brown and Buff Leghorns are popular and are good layers, but the former as pullets are apt to lay rather a small egg and the latter many that are not pure white. (See Fig. 2).



Black Minorcas are larger than Leghorns; lay perhaps the largest and the finest looking egg of any variety of poultry and many of them. But the color of their plumage and their immense comb and wattles have always proved a handicap in the race for popularity with the American public. Anconas, or what might be designated as a mottled Leghorn, and Campines which, roughly, are a sort of enlarged Hamburg, have had an increasing measure of popularity the last few years. Both are good layers of large, white shelled eggs, and either variety is beautiful and belongs in the strictly laying class of poultry.

Some of the serious problems of the egg farmer handling these exclusive egg breeds only, is that they are inclined to be over shy and nervous and to throw in the chicks a preponderance of males. The first problem can be almost completely mastered by persevering and continuous gentleness in handling and management. Representatives of this class, particularly pullets and cockerels, should never be caught except after dark. They must then even not be unnecessarily scared or aroused. The proper way to lift one off the roost is to put the open palms of both hands gently, but with quickness and firmness, over each wing, grasping the body. Then transfer the left hand to grasp the legs placing the index finger between the legs, with the thumb grasping one leg and the three fingers the other. The right hand should now be slipped under the breast, or, if very wild, may be kept on the back holding down the two wings. Never "grab" at a Leghorn, strong as the impulse or temptation to do so may be, lest the bird be thoroughly scared and an impression left on the sensitive brain that many months of kind and careful treatment will not eradicate. One or more "scary" or scared Leghorns in a flock will keep all the birds in a turmoil on the slightest provocation, and such had better be removed and disposed of. The easiest way to "tame" a flock is to have them looking for you plus some favorite food. *The relation of tameness and contentment to a big egg yield are usually not appreciated at their full value.*

The preponderance of cockerels in Leghorn chicks cannot be controlled by selecting eggs of a certain shape; by using a male of a certain age or by any such schemes. However, the cockerels must not be tolerated, and what are not marketed at eight to ten weeks old, (the most profitable time to do so), must be separately yarded.

There is one rational and sure way by which we may at least partially control "nerves" and "sex" in Leghorns. Never tolerate an over nervous or scary individual, male or female, in the breeding pen. And having found a hen with a disposition to throw very few or few cockerels among her chicks, try fixing this as a family trait, as will be outlined under "Trap Nests and Pedigree Breeding."

#### THE MARKET BREEDS:

Perhaps the breed of fowls known as Cornish, particularly the Dark Cornish, there being three varieties, the Dark, the White and White Laced Red, is more nearly a beef type of fowl than any other that we have. But as intimated under "Laying Breeds," different varieties and breeds are very readily shaped to the wishes of an intelligent owner-breeder and many of our different varieties of fowl can be bred into strains of great, big killing chickens. In England, where the Cornish originated, it is much used to cross with Dorkings to make the largest sized and highest grade of market poultry. In America,



Fig. 2. Brown Leghorn Hen of unusual size. Weight  $6\frac{1}{2}$  lbs. Although this particular hen was much prized on account of the large sized eggs she laid and as the progenitor of a family laying eggs like her, such size in Leghorns is not desirable. For, as a rule, such large Leghorns lay small eggs and comparatively few of them.

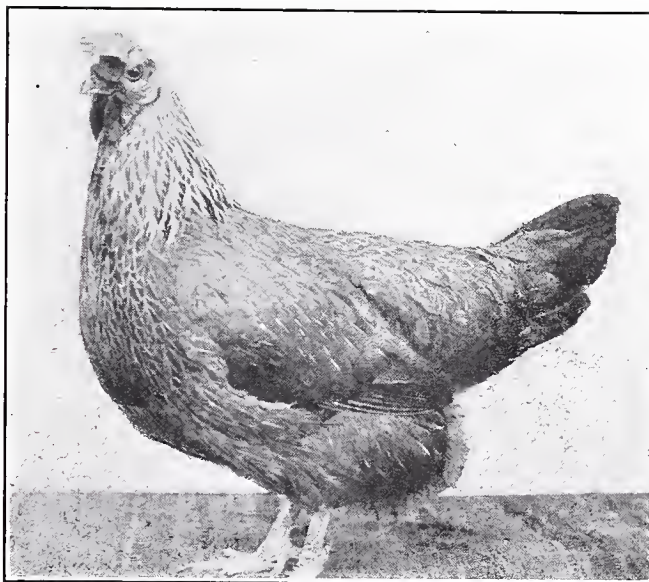


Fig. 3. Silver Grey Dorking Hen. Courtesy of Mr. Watson Westfall. The Dorking was, in all probability, the prized table fowl of the ancient Romans, cultivated for many years in England and very popular in that country. It has white skin and legs and has five toes.





the Light Brahma is perhaps used as much as any where extreme size is wanted. This variety is often crossed with the White Plymouth Rock for the same purpose. While on the Light Brahma, it might be well to say that at one time it was much thought of as a very good layer of the largest-sized eggs, but breeding for great size, for feathers and for leg and toe feathering seem to have spoiled it for laying, and to-day it is little heard of or bred. The buying public does not seem to want too large a killing chicken, hence the great popularity here for this purpose, of the Plymouth Rock, the Wyandotte and the Rhode Island Red, or birds of similar size and weight. The White Orpington, the Dorking (see Fig. 3) and the Houdan are hardly worth mentioning, as the great bulk of our people believe in and demand a yellow skin and yellow fat market chicken. The writer does not share this prejudice which shows its inconsistency the strongest in the market stall, where the buyer refuses with disdain to buy a beef steak with yellow fat, and yet at the same stall imperiously demands a yellow fat chicken. In his experience, a fine-grained, tender-meated chicken is always a thin-skinned one, and looking long enough, a thin-skinned one is always a white-skinned one. Not that he would argue for a bluish or blackish-skinned one, but rather for a pinkish-white one, fatted or better, finished with ground oats and barley and milk, as against corn.

Market breeds are mentioned in this bulletin so that no one may get the idea that large, heavy, over-grown chickens for market purposes should be kept for egg production. If any "market poultry" is worth while for this, then it is under the class of

#### THE GENERAL PURPOSE BREEDS:

Under "Market Breeds" it was stated that the American public did not, as a rule, demand extreme large size, but preferred birds of the American class or similar size.

The larger per cent. of people keeping poultry prefer a variety of suitable or profitable size for killing and one that will lay some or many eggs besides. Our Rocks and Wyandottes and Reds fill this want exactly. The Rocks were the first on the ground and the Barred Plymouth Rock is to-day probably, not only in Pennsylvania but in the United States as a whole, the most popular pure-bred variety. To have them right, the color in males should match that of the females—a proposition, easier to state than to bring about or to hold. The White variety has already been mentioned. The Buff variety is very popular with many, but shares the fault or weakness of all breeds of this color; it fades or washes out in the adult years. Newer and very handsome Plymouth Rocks, are the Silver-Penciled, the Partridge and the Columbian.

Wyandottes have their prototypes in the colors or varieties of the Rocks, save the Barred; the White variety strongly leading in popularity and numbers. Wyandottes have a curved, close-fitting to the head rose-comb, and while running a pound or more less in weight, they are shorter, deeper and plumper than the Rock; a distinction of type or shape which appears in the eight-week-old chick and is maintained throughout the entire period of growth and maturity. Besides White, Buff, Silver-penciled, Partridge and Columbian, we have Blacks, Goldens and Silvers. The latter were the original Wyandottes.

dottes, and with eight Standard varieties to select from, anyone should be able to please their fancy when determining which variety to handle.

Rhode Island Reds were the last to appear for a bid for popularity in this great middle weight or general purpose class. Originally, the common farm poultry of a certain section of the State of Rhode Island, they were "discovered" by certain poultry breeders and by them divided into the single-comb and rose-comb varieties (and later the pea-comb or "Buckeye") more nearly perfected in color and type, and brought before the American public. By reason of their intrinsic value, outside of any "pushing" they may have had, they have made their way to great popularity. Of practically, identically the same weight as Wyandottes, they are nearly as active foragers as Leghorns, with not nearly so much mischievous destructiveness in their make-up. They are good layers and fast growers and the matter of not breeding or staying true to color is their one great handicap to-day.

The Orpingtons, a breed of fowls originated by William Cook, Esq., of Orpington House, England, are the great English general purpose fowls, and since the very day of their introduction into this country they have been gaining in popularity until it is probably within the facts to state that no one breed in this history of American poultry culture has created so much interest and sold so largely and at such phenomenal prices, as one variety of this breed; viz, the White. (See Fig. 4.)

Of the ten or twelve varieties, only three, the single combed Black, Buff and White, have attained any large degree of popularity; and while the two former are largely bred the latter has greatly outstripped them. They are a large, massive appearing breed with long, round, deep bodies, full breasts and broad backs, the legs being rather short and skin white. In actual weight, however, they run not more than one to two pounds over the Plymouth Rocks.

The "boom" that the White variety is enjoying has prejudiced some against it; and yet, in all fairness, it must be said that the White Orpington deserves much or all of the popularity it now has. It is a superlatively good winter layer; it has a most likeable and quiet temperament or disposition; it is a quick grower and a splendid table fowl where there is no prejudice against white skin and white legs; it is a splendid setter and mother, and its one fault, as I have found it, is its inclination to be an inveterate broody beginning early in spring and extending well into the summer.

All these general purpose fowls, unless their laying qualities have been neglected through indifference or, say in an effort to get extreme type or color, are good layers in their pullet year, and are especially good winter layers. *When bred and selected especially for laying they will make records equaling those of the better Leghorns.* But, as they run, all of them are inclined to get too fat as two-year-old hens (some varieties and some strains more so than others), and the stock of layers must be replaced entirely or in greater part, annually, if a large egg yield is to be kept up. If no attention is given the matter they are likely to run out as layers or to degenerate into excessive broodiness, for broodiness too may or may not be made a family trait. And broodiness, while desirable in general purpose fowls, causes much loss of time at egg production. Some strains or families will even show a strong predisposition to broodiness in mid-winter, a thing no one after eggs can or should tolerate.

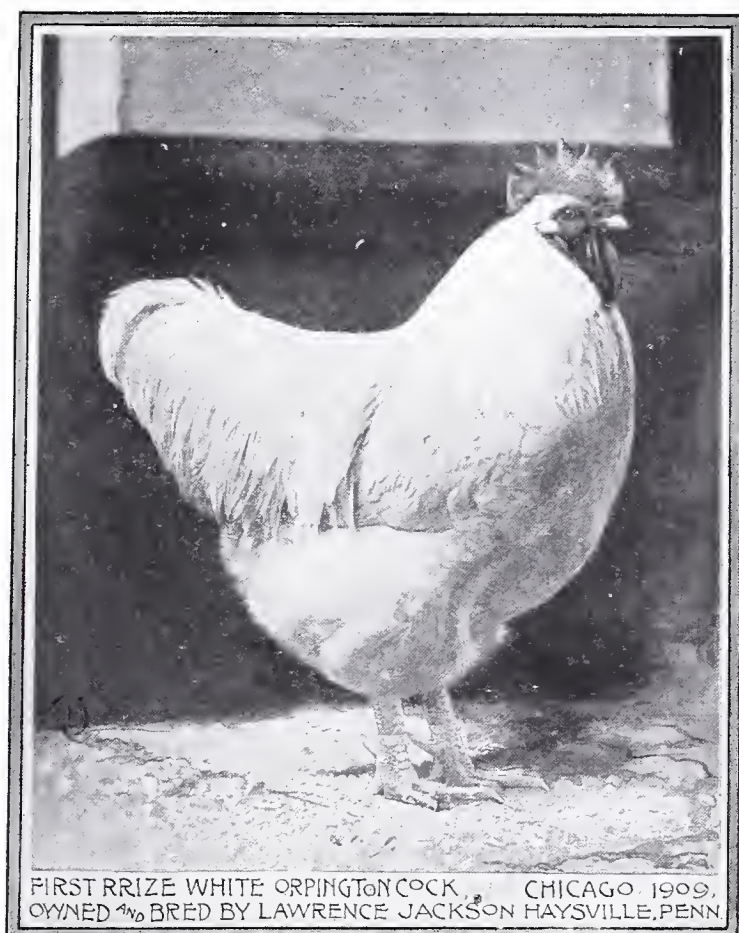


Fig. 4. White Orpington male that beautifully illustrates Orpington type, and a noted show-room winner. The quick growth, hardiness and egg-laying capacity of the White Orpington has been little hindered so far by show-room standard requirements. Which, is as it should be, for it has come about that the American public will have little to do with a breed or variety loaded with fancy points.

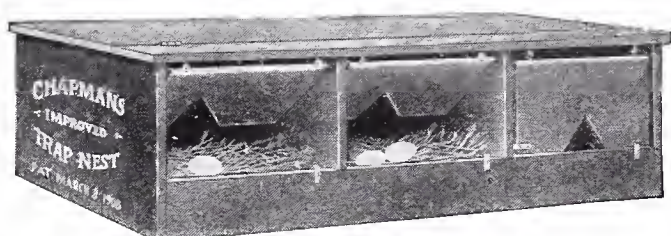


Fig. 5. Trap nest most used and best liked by Mr. Wittman. There is absolutely nothing about it to get out of order, being simplicity itself. Besides, it can always be relied on to work smoothly and surely. And the hens like the nest.





## THE FANCY OR ORNAMENTAL BREEDS:

Many of the breeds or varieties that are deemed merely fancy, if properly handled, are good layers. Frequently, wonderful layers. But, few of them are adapted to the farm or to being kept in large flocks for egg purposes. The Hamburg family particularly, (the Silver Spangled variety at one time quite popular, being found even on our farms) is sometimes spoken of as "Dutch every day layers;" but the eggs and the carcass both run too small to find ready sale in our markets. Hamburgs of all varieties are very showy and beautiful. So are the Polish or "top knot chickens." The crests or top-knots through selection and breeding have been developed until they reach an enormous size and are very beautifully even and perfect. But these crests obstruct the vision making them timid, an easy prey to vermin and much subject to colds if allowed in the wet, making them entirely unsuited for farm poultry. Yet, if petted and well fed and properly handled, they will prove good layers of large white shelled eggs. The Houdan should not be classed as a fancy breed, and yet by reason of their crest and color of plumage and skin they are not suited generally for Pennsylvania farms. They have the five toes of the Dorking, the same superb table qualities and lay an unusually fine and large white egg. To those wishing something extra nice for home use in the way of table poultry and eggs, I should highly recommend the Houdan.

Bantams are usually thought to be entirely ornamental. And yet some varieties are good layers of what, when the size of the birds is taken into consideration, are unusually large-sized eggs. And now that more fathers than ever seem willing to gratify the small boy's yearning to learn from Nature direct and to have something alive for his very own, Bantams with their cute and saucy ways will help to fill this want.

## COMMON FARM AND "DUNG HILL" POULTRY:

It is most unfortunate that much of our farm poultry is still of the mongrel and dung-hill type. There never will be anything much doing along the lines of increased winter (or summer) egg production with this kind of poultry. The original cost of starting or stocking up, with pure breeds, is so small as compared with the increase in results that no one can afford to keep or work with any other kind. If the average number of eggs on the farm per hen per year is about eighty, then it is because there are as yet comparatively few representatives there of pure bred breeds that will lay from one hundred to one hundred and fifty eggs per year. If village and town people on the average get a great many more winter eggs than farmers, it is because a great many of these, comparatively, have pure breeds.

It is freely admitted that among mongrel and non-descript flocks in which no one can or does take any particular interest or pride, there may be sometimes a good individual layer. But if such does occur, she is merely a freak and usually cannot or will not perpetuate herself. A mixed, mongrel flock is no credit to any farm, and at once, in these days, stamps the owner either as careless or unprogressive.

Working with poor poultry is working with poor tools indeed.

There is considerable prejudice against fancy poultry, some of it unfortunately well founded and working for a continuation of non-

de-script farm poultry, but, for the popular mind to continue to class Barred Plymouth Rocks or White Leghorns, or similar breeds and types as "fancy poultry," is both wrong and ridiculous. *They are not fancy poultry, but "pure-bred" poultry.*

#### GRADES AND CROSS BREEDING:

A compromise or partial solution is offered by "Grades." Grading up a flock by an annual or bi-annual introduction of pure-bred males from laying strains of one particular variety, is an easy and cheap way of improving a flock. In the bi-annual method, using the sire on his own daughters.

In poultry breeding we are fortunate in having a new generation every year, and it may require not a great many generations to thus grade a flock so that in appearance and performance, it would closely rival pure-breds.

Cross-breeding or breeding two pure bred varieties together should never be thought of or practiced. The only exception might be, if the object were to produce some specialty meat chickens, like capons or soft roasters. And then should not be practiced unless with a considerable working knowledge of the ancestral make-up of the varieties proposed to be used. For instance, Dark Cornish crossed on Dark Dorkings or on Golden Wyandottes for capons, will nick splendidly. Or for the same purpose, White Cornish on large White Rocks. Or for soft roasters Light Brahma on White Rocks.

#### THE QUESTION OF TYPE—EGG TYPE:

Is there an egg type? There is, but we are not as well acquainted with it or have it to the extent that we should or will have after a few more years of the trap nest and of pedigree breeding.

"Type makes a breed, color a variety." More attention has hitherto been paid to standard type or to show type than to egg type or utility type. For instance, thousands of poultrymen have very definite and positive knowledge as to what constitutes Wyandotte type or Orpington type, but few have as definite an idea as to a laying type. We have no written standard for a laying type. Even the Leghorn type, as fixed by the Standard or show room excellence, does not particularly exemplify the laying type or egg type in several sections. There is strenuous objection in some quarters to the present standard or show room Wyandotte type, making the breed as it does, short, with a broad back and deep, round body spoiling it for heavy egg production, as being in radical contradiction to our accepted egg type.

To give a word description of what constitutes a laying type or an egg type, is very difficult and a few pictures are offered instead. (See Fig. 1).

#### TRAP NESTS AND PEDIGREE BREEDING:

When A. J. Silberstein first prominently brought to the attention of the American public the trap nest, he did the poultry breeding world an inestimable service. Without the trap nest, poultry breeding was mostly pure guess work. With it poultry breeding approaches a science. (See Fig. 5).

Trap-nests might be described as nests that trap the hen. In other words, a hen entering a trap nest is trapped by some automatic device attached to, or part of the nest, and is not released until the

owner comes along, gets her leg band or her description, and gives her credit on an egg record sheet or memorandum for the egg found in the nest with her. These nests must be looked to several times during the day and the hens released, but as eggs should be gathered several times a day anyhow at most seasons as will appear under "Table Eggs and Egg Yields," this will prove no great hardship.

There are a score or more of patented trap-nests, in fact all the good ones are so protected. Some are very simple, some very complicated. The best ones are all in the former class and are usually extensively advertised in the poultry papers and in some farm papers. Some manufacturers sell the completed nests, others sell plans to build. Every farm should have its tier of trap-nests and these could be in use at least in the winter time if at no other season. It is very interesting and very profitable to know which hens are laying and which are not. Which hens are laying heavily and which sparingly. Which lay large, even, saleable eggs, and which small, misshapen, unsaleable ones. And there is a whole volume to be learned after knowing which hens of the flock are the heavy layers, in closely observing these; as to how they feed, what they feed on, when they go to roost, when they leave the roost, when they moult, how they moult, how their eggs hatch, how often they go broody, the size, color and texture of the comb, the shape of the body, the size of the "egg basket," the expression of the eye, the width between legs, etc., etc., etc.

But the one thing the trap-nest brings us, topping all else in value, is the ability thereby to certainly and positively identify the eggs of one or all of our hens and thereby making straight pedigree and line breeding possible.

Suppose our winter's use of the trap-nest has shown us that we have a small per cent. of hens that laid the bulk of the winter eggs. *Then those are the hens we want to set eggs from the following spring* in the hope that we may thereby make a start towards perpetuating winter egg production as a family trait of our line of chickens. To do this we must also find hens that are prepotent or that can perpetuate this laying quality in their offspring. We must use males only from hens that are proved heavy layers, and these in turn from a line of heavy layers. Then again the male must be prepotent or have it in him to perpetuate the laying quality. Now, suppose further, these were mongrel chickens with no breeding lines whatever established, and we have some inkling of the difference between this kind and representatives from a bred-to-lay variety of pure-breds. Or the difference between the low level of the mongrel hens' average of 80 eggs per hen per year and the high level of the bred-to-lay pure-bred hens' average of 150 eggs per hen per year.

*It is time to shove the mongrel hens off of the farms of Pennsylvania.*

On most of our farms no one knows which hens were the winter layers, so when Spring opens eggs are set from all the hens on the farm. The term "all" is used advisedly, for in the spring-time every last old stump of a hen is laying some eggs; no matter if they lay at no other time of the year, all hens lay in the Spring. Why. Because they can't help it. Because Spring is Nature's season for the hen to lay eggs, and in response to Nature's call to reproduce at this season,



even decrepit, tubercular and otherwise sick or low in vitality hens will lay some eggs. Setting eggs thus promiscuously gathered or from such stock is sheer folly.

On the other hand, supposing there should be some particular feature or quality of one of our hens that we might wish to perpetuate, like the one, for instance, mentioned in a previous paragraph. We would get her eggs by the trap-nest method and set them separately. Then we would select a likely cockerel, a son, and breed back on to the mother. Thus getting chicks three-fourths the blood of the mother and we might inbreed until the descendants would be fifteen-sixteenths or even thirty-one-thirty-second the blood of the mother or dam. Thus we might fix the particular thing we are after. Such breeding requires skillful study, perhaps almost an intuitive knowledge or insight of poultry quality and few may be able to successfully follow it out.

The point which the writer wishes to make is, that so-called *inbreeding* is the only way in which we can perpetuate new or desirable qualities or hold said qualities when we once have them. In other words, a good laying strain will not play out for the want of new blood, if the blood or breeding are properly taken care of.

*We have never had much poultry carefully bred for its laying qualities; we have merely had clods and to "change roosters"—bring in another clod—won't increase the egg production of our flocks.*

Outcrosses or new blood trend towards an increase of growth, of size and of vigor but not directly in an increase in the yield of eggs.

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## MANAGEMENT

### THE BIGGEST ASSET—VIGOR:

So far our principal plea in this matter of increasing the yield of eggs, has been the importance and the desirability of pure bred and line bred layers. *But our principal asset, our bank account to draw on, is vigor.* (I wish this could be put in capitals four feet high). For, judging by the way the average individual keeping poultry for eggs or for any other old purpose, neglects and abuses this vitally important thing, it would seem necessary to present it in a very large and in a very vivid picture. Although we may fail to recognize it, without constitutional vigor we are up against a stone wall; hence the importance of the

### CONSERVATION OF VIGOR:

When we are keeping a bunch of hens penned in a small, bare run or worse, keeping them confined to a house the year round, we are not conserving vigor; we are stealing same. Not only robbing ourselves but robbing others who may have to take up or use this poultry, or poultry out of it. When we set eggs from hens "that look all right" or "are well taken care of" that are thus jailed, we have trouble with our hatches, trouble with our chicks, trouble with our poultry. Let's be fair and recognize the source of these "troubles."

Next to prison conditions, there are many other conditions and things that will lower the vitality of our poultry. Most of these do it very slowly but do it none the less insidiously. These will occur to the poultry keeper, that is not mentally lazy, in his daily routine of caring for his stock.



## THE MIRACLE OF A FEW GENERATIONS OF GOOD FEEDING AND HOUSING.

This is frequently strongly demonstrated; and fortunately for us, if through no fault of ours we have on hand poultry that is low in vigor, we can quickly upbuild and restore this. A simple and uncomplicated method of poultry feeding and housing will do it the most easily and effectually. Let the chicks be born right. Even a chicken should have a right to a right beginning. Millions are spoiled in the hatching; due not as much to the incubator as to the average man's incompetency with the incubator.

Let them be brooded right. Let them have proper food, fed properly. Let them have a chance at the open, at free range. And let them never want for oceans of fresh air day and night, but at the same time, never lacking for perfect shelter.

"Fussing" is the last thing essentially necessary in poultry keeping and yet in building up stock low in vitality, there seems to be no way out of doing some of it.

Chickens hatched and raised in villages and towns or anywhere in small bare runs, especially after the first or second generation, never are heavy layers. They can't be. They don't have the vitality to digest food enough to lay well. They don't even have the appetite to eat enough to lay well. Someone, somewhere, must put back vitality into poultry stock for these people, or they must quit poultry keeping. Many times these thieves of poultry vitality do quit and the poultry world has been made the poorer for their having been in it.

The moral would be, that those village and town people or those with none but small, bare yards who are expecting of their poultry exhausting work at the egg basket, *not to attempt to raise their laying stock*. But to let those with natural and easy facilities for so doing, raise for them strong, vigorous and ever hungry egg machines—laying hens.

## WHY BREEDING FAILS WHEN VIGOR IS LACKING:

Some of the reasons have been hinted at, and *anyone will find it a safer proposition to bank on a winter's egg yield by using a bunch of free, farm range "dung-hill" pullets, full of vigor and "hunger," as against a bunch of line bred pure-breds run out in vitality and appetite*. "Breeding" here has all gone to smash! But, this is no fault of breeding, it is the fault of keeping, or management.

On the other hand, a hen may have vigor to burn, but because laying has not been made an individual trait with her, or a family trait with her progenitors throughout a series of years, she will never rise above the mediocre. She may have constitutional vigor all right, but that will never raise her above "the 80 eggs per year per hen on an average," class.

Finally, while therefore it is freely admitted that breeding fails when vigor is lacking, it is just as strongly claimed that selecting for vigor alone, when a certain stage is reached, progress in making a strain of layers will be very slow or at a standstill.

*Pure-bred, trap-nested pedigree or line-bred poultry may be and should be, bred along the line of both increasing the egg yield and the constitutional vitality or vigor, and thus bred it is the one and only poultry we can depend on to greatly increase our yield of winter eggs.*

## EARLY SEPARATION OF COCKERELS AND PULLETS:

In the "management" of our laying poultry, the conservation of our bank account—the vigor of our stock, is always the first consideration if we are "on" to what is best for our own interests. The popular use of the term conservation is new, and the practice of carefully guarding and looking after the vigor or stamina of our poultry for egg production is even newer. We have heard a lot of the necessity of the early separation of the cockerels and pullets, but how many people actually practice this. In egg getting the males, except the selected breeders, are absolutely useless and should be treated as vermin. Or, should be got rid of at a very early age; or be made over into capons.

A vast amount of ignorance and prejudice is still existent against operating upon cockerels. When any farmer's boy with a set of instruments and a little practice can readily master it and turn the troublesome males into perfectly quiet and reasonable stock. Besides, that caponizing is essential to producing the very finest grade or quality of table poultry cannot be questioned. There are two profits in capons: the indirect one of the possibilities of stronger and better pullets and better laying as a result of the absence of males and in the realization of an average of twice as much per pound weight as against ordinary roosters.

## HANDLING THE FUTURE BREEDERS:

There is still a great deal of difference in opinion as to whether excessive heavy laying lowers the vitality of a hen in a breeding sense. Most poultry keepers think it does. However, as we get along in evolving heavy layers the writer predicts there will be a change of belief.

There is no reason why a hen "built that way" should not lay 200 eggs in a year and her eggs hatch good, strong chicks. Hens that we now have, laying 80 eggs per year, lay eggs that hatch such chicks.

When we retard laying in a bunch of hens we propose to use as future breeders, we always find some that won't be retarded. The chances are that when egg setting time comes eggs from these hens hatch well and chicks live well. The safe way to do is not to feed future breeders after any method that might suggest forced feeding. Or handle them after a manner which acts as an equivalent of forced feeding.

Always incline towards keeping stock intended for future breeding purpose, provided always it is fully matured, thin as against too fat. Avoid excessive fat as you would avoid poisoning your stock.

Allow none of your future breeders ever to be sick. If they do get sick, don't save them—for breeding at least. Use no hens showing any ovarian troubles or any of the diseases common to laying hens, for as our hens are bred up for heavy laying these troubles are bound to increase unless we are constantly on guard against them. It is not proposed to give any remedies for the cure of sick chickens in this bulletin, *for it is a fact that cannot be disputed that we have no need to have many sick chickens. Or that when having any, that the best cure is not killing and burning them very promptly.*

## THE GREAT VALUE OF A VIGOROUS MALE AND HOW TO TAKE CARE OF HIM:

Always the male is half the flock. Or if there are twenty-five hens and one male the male is still half the flock—in a breeding sense.

There are times when a male can in this sense be more than half the flock. When a deeply in-bred or line-bred male full of quality and vitality is mated with an ordinary mixed lot of farm poultry, his qualities are going to predominate or be the stronger in most of his chicks. Hence, the great desirability of buying a few males bred from heavy egg producing families to use in grading up a flock of ordinary poultry. When such a male or males are purchased, common sense would indicate that they be mated to selected hens only and that these be given the best chance. Or, that they be allowed free or best the range, and that if any be shut up the poorest poultry be confined. It seems utterly inexplicable why any one buying or procuring improved poultry should shut it in.

It is better to lose a good bird outright occasionally than to kill the whole lot by inches by robbing them of vitality in shut-up quarters.

Good management strongly dictates that a valuable breeding male be not allowed to run with the flock the year round. He should be allowed this privilege only during the breeding season, and the rest of the year given a roomy yard alone or in company with others of his sex. In this way his life as a breeder will not only be prolonged several years, but he will be a better and a surer breeder.

The question as to how many hens to mate to one male is asked very frequently, and is one that cannot be definitely answered. One good rule is, that the closer the confinement the smaller the number of females. Another good rule is that the heavier the bird or the breed the smaller the number of females. The writer has known one isolated case, where, in Leghorns, one male with sixty females on free range gave splendid fertility. Ordinarily half this number of females under like conditions is better. Too few females shut in with an active male trends towards a low per cent. of fertility.

The practice of changing males on alternate days has nothing to recommend it. Better to use one male the first half of the season and the other one the other half. If the male gets too thin in flesh during this time a better way is to feed him separately, daily. This is often necessary with young and over-gallant males of the smaller or more active breeds. Most males won't keep free of lice. Either because they won't stoop to taking a dust bath or because they are constantly exposed to new infection. It is a safe plan to thoroughly dust with insect powder every breeding male on the place several times a year.

The matter of a certain males not mating with a certain female has puzzled many. It is sometimes found, when non-fertile or clear eggs persistently turn up from one mating or yard, that they can be all traced to one hen or hens. Such hens should be removed or remated. In farm flocks with several males this rarely or never happens for affinity or natural selection here has full chance to work out the solution of this problem. Astute breeders among poultry fanciers make it a point to begin to select their future breeding males almost from the day they are hatched and they look for and prize certain qualities in the young males as they grow and develop. For instance, a first class or desirable male in pullet line Brown Leghorns can only be satisfactorily selected by knowing exactly how his baby chicks feathers were colored and stippled.



In selecting our breeding males to increase egg production it is highly important that we know that as chicks they were strong, thrifty growers. The oft repeated advice for breeding a male full of fight and crow the writer is not willing to subscribe to.

In doing a lot of careful and methodical, almost plodding poultry breeding, his experience would indicate that the stronger and more prepotent breeders were not necessarily scrappers. Nor did it seem necessary that to get even mere high fertility it was necessary that the male be of the sort that is carrying a chip on the shoulder. One of the quietest Legborn males the writer ever owned was practically a hundred per cent. fertile even as a five-year-old. However, he would not be misunderstood. If a male is a quiet or cannot fight or crow lustily because he is low in vitality (and many are thus) have naught to do with him. Fighting or "scrappiness" may be a matter of disposition and family as much as it may be an indication of high health and vigor.

#### COMMON SENSE AND REGULARITY ALL THE TIME:

As previously intimated, there is much lack of "common sense" in the way many people not only view poultry keeping, but in the way they actually keep and handle poultry. Take the matter of the much heralded intensive poultry keeping and the large profits so extensively advertised. It seems almost impossible that any thinking man or woman can reason out the former or swallow the latter. The hastiness too with which many poultry keepers jump at conclusions does not have common sense to recommend it. Within the month these lines are penned the writer has come across several instances of this, let alone the hundreds of instances that have come directly under his observation. Common sense is not only lacking in many individual poultry operations, but there are practices in poultry keeping in this State that are almost universal that have nothing like good sense to recommend them.

Regularity all the time is one of the imperative things in poultry keeping. The work is never very hard, but what work there is is work that needs to be done with clock like regularity. There are no Sundays and no holidays in poultry keeping. The Sunday work can be so arranged that the minimum need be done on that day and yet there is some work that must be done as on all other days.

The most important of this is the regular hour and system of feeding. The system and hour of feeding should be carefully considered and then as carefully adhered to. Feeding at irregular intervals causes restlessness and discontent in a flock, disturbs digestion and egg laying. Poultry quickly learns to carry the time and if the feeding is always at exactly the same time they will not lose much time fretting for the feeding hour but spend their time in activity along natural inclinations.

Feeding and caring for poultry at regular hours and after an established system trends strongly towards success and profit. Towards making the work easier, and consuming the least time. Which does not mean to imply the getting into a rut. There are many conditions over which we have no control and to do the usual thing at the usual time under unusual conditions is foolish and not common sense at all.

Common sense again too would indicate that any scheme of poultry keeping that involves ten dollars' worth of labor to get one dollars'





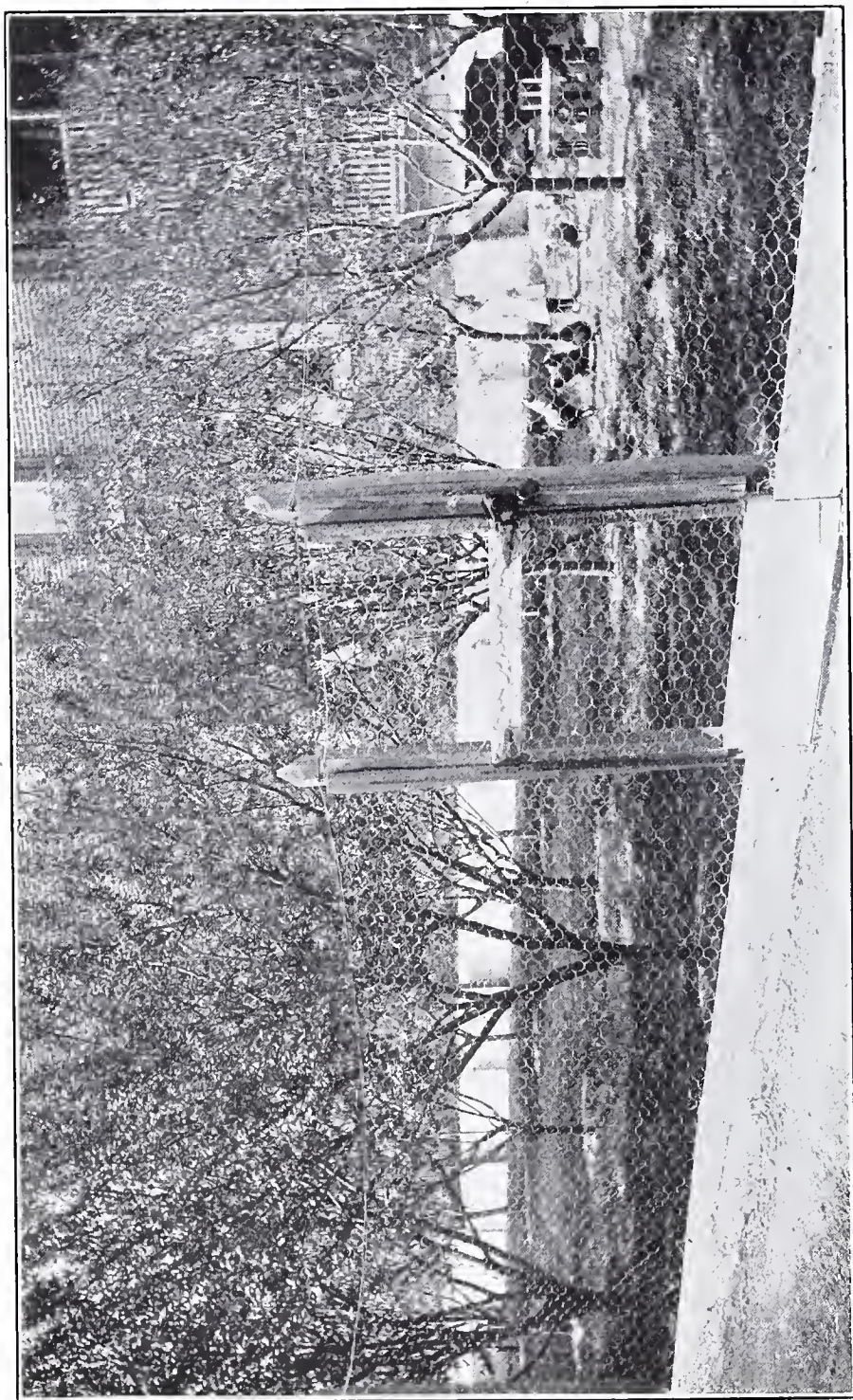


Fig. 6. A town poultry yard 50x120 feet, planted to thirty peach and plum trees and kept thoroughly cultivated around the base of the trees; the balance in heavy sod. This yard would successfully raise to maturity yearly a dozen fine pullets and carry them through the winter and show no sign of the ground being tainted. Most town people try to raise from 50 to 500 on such a plot of ground.

worth of chickens is not likely to appeal to anyone very long and that money invested in houses and appliances compelling such an inverse ratio will be eventually wasted. And where anyone attempts to apply such a system of poultry keeping on a large scale as is frequently done of late in various degrees, he is face to face with conditions tersely summed up in Farm Poultry a year or two ago.

*The man cannot stand it.*

*The stock cannot stand it.*

*The land cannot stand it.*

If anyone who is thinking of building a long, continuous poultry house, with small, narrow yards in front, style of plant or of establishing a large plant on a small plot of ground, will thoroughly study the above three lines he will save himself a lot of money and a lot of disappointment. Poultry won't stand being converted into factory hands and poultry keeping into factory methods. But what of the people living in towns and villages? Are there

#### INTENSIVE METHODS FOR TOWN POULTRY KEEPERS

that make it worth while for these people to bother with poultry? The writer would say both yes and no to this. He would say "yes" decidedly when town poultry keeping means a hobby or a means of rest, or change, or recreation for men or women who earn their living indoors and to whom "pottering" for hours around poultry is so many hours added to better health and better living. (See Fig. 6). For these people the item of labor is never to be counted. These people, too, have the time, the patience and oftentimes the ability to so "make it up" to their shut-in poultry that same is very successful. Spading the yards once a week or oftener, all during the open season, supplying green food several times a day, using all the table scraps in a sensible way, thus providing the much craved variety of diet; all these things can be a labor of recreation and a labor of enthusiasm with the town poultry keeper. And he can show results; results such as are rarely achieved on the farm or regular poultry plant. But where this sort of town poultry keeper misses it, is when he persuades himself he could duplicate his success on a large scale. Probably the worst failures in the poultry business are made by this class.

An emphatic "no" is the only answer to be given the town poultry keeper who proposes to be such for mere profit. The restricted areas of the town are no place to raise chickens or to go into the poultry business. The town is no place for many people to have or to own chickens after the care and methods of these people, and as we understand clean food and clean food products better, the boards of health will have to drive many such out of keeping poultry. Slops and garbage and filth do not make better eggs than they do milk, and "garbage fed" milk has been ruled out of our towns long ago.

#### THE COLONY HOUSE, FREE RANGE SYSTEM:

Lucky indeed is the man knowing little of the real ins and outs of poultry keeping, who starts in on the colony house, free range plan. *This man has at least a chance of staying in the business.* It is not impossible to keep large numbers of poultry in close confinement on the same ground for a number of years. But it is not practical on the soils of Pennsylvania and after the enthusiasm wears off the constant and incessant strain of making good becomes very wearing and the end is the same as if there had been down-right failure, abandonment of the venture.



The only safe and sane poultry keeping we know of to-day is that which embodies the idea of plenty of room and the conservation of the vigor of the stock and its ability to be profitable. Some land may be heavily and continuously stocked with adult poultry but no land here so crowded will raise good chickens for more than a few generations. Hence, has grown up the more or less highly successful plan of raising all young stock on unlimited free range and yarding the adult stock.

But this plan is frequently imperfectly understood. Unlimited free range if merely bare, hot fields, is not much of an improvement on bare yards. Any sort of land is considered often good enough to grow chickens. But the better the land the better chickens it will grow. Also, no land is ideal for growing poultry unless it has some shade. Again, unlimited range may be robbed of much of its force if the stock is all housed close together or is housed in one big house. Hence, the value, or, the necessity of the small colony house. Only by "colonizing" the broods can we really have unlimited free range. Housing this stock in the Fall in permanent winter quarters is for many the one best way if the maximum amount of winter eggs is desired.

However, if the maximum amount of vigor and vitality is desired to be retained, the breeders or breeding stock should be left right out in the colony houses; not shut in the houses but left out on the range. Such breeders may not lay very strongly (they often do, though), but with the opening of Spring, they are in all breeds, practically every day layers. Every egg hatches. Every chick lives. And here is where the claim that the scattered colony house plan involves a lot of work, can be refuted. The writer, after plenty of experience both ways finds it very much easier and less work to make the rounds of scattered colony houses for the stock laying the eggs for hatching, then to "make it up" to the shut-in breeders. He finds he gets more eggs and a great deal better eggs and chicks much easier to raise, and gets a deal less of worry and disappointment besides.

The ordinary farm, except where conditions are unusual, with more than one hundred head of laying stock should have a second poultry house; or, as many more as needed. It should have an equipment of colony houses, cheap, shed-roof style, easily moved from field to field. Besides this, it should have a large number of small brood coops (taking for granted the chicks are to be raised by hens; if not, then of brooders) especially built and kept for the purpose. For the climate and the situation of Pennsylvania, where we want our chicks early, old boxes and old barrels for brood coops as make-shifts, are wasteful and not to be tolerated. It is just as important that the farm have a good equipment for raising and taking care of a valuable crop like poultry, as it is that it have a modern equipment for seeding, harvesting and marketing wheat, corn or potatoes.

#### POULTRY FARMING ON A LARGE SCALE:

Poultry farming on a large scale has been attempted sporadically all over our country; within the last two or three decades, most frequently. In most instances this had quickly proven to be a failure. However, within the last few years a new era for the large poultry farm has set in, and there is every likelihood that as the fundamental





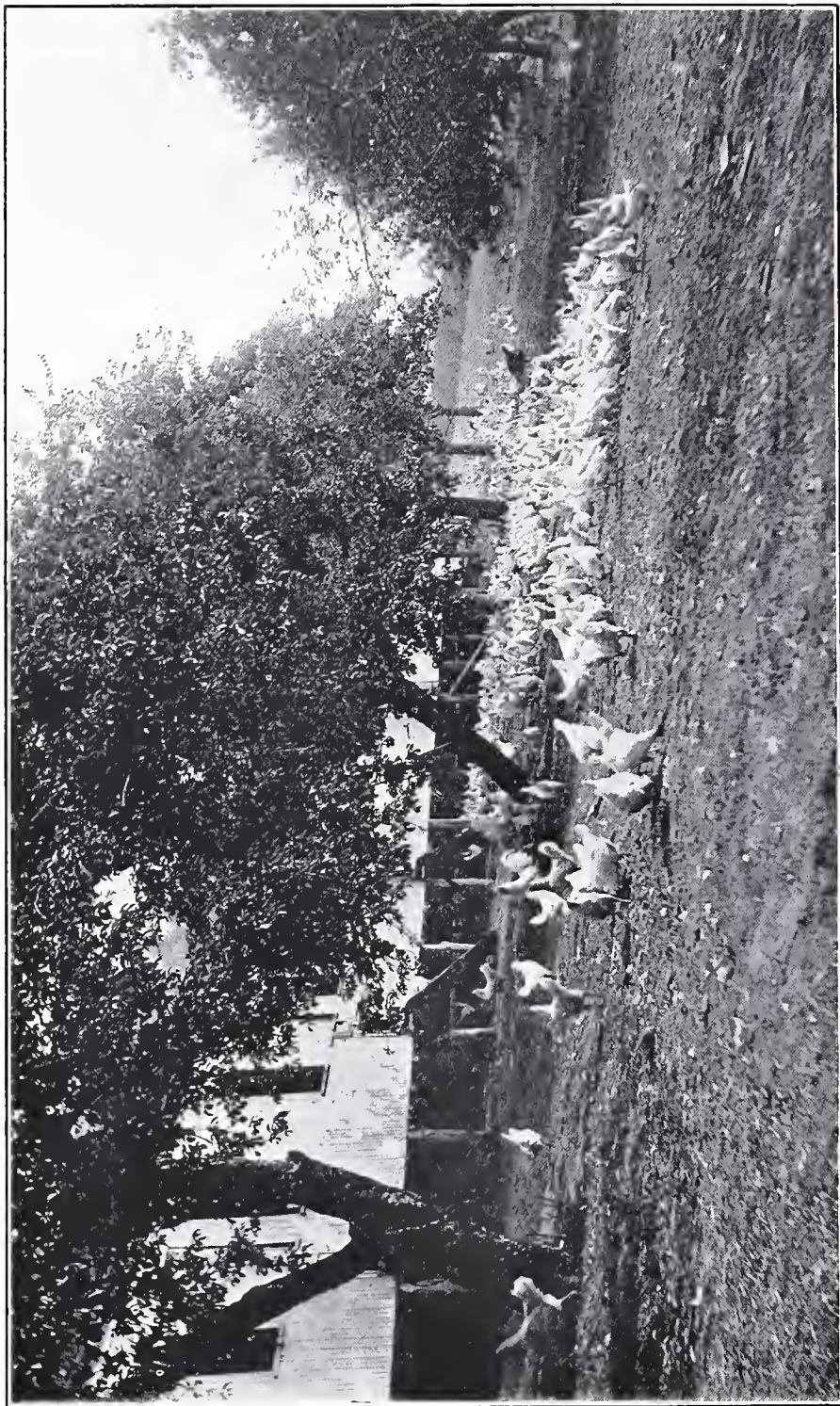


Fig. 7. A large White Leghorn poultry farm in eastern Pennsylvania. To meet the demand for the enormous number of large, white shelled eggs (known commercially as White Leghorn eggs, particularly of the New York market, large poultry plants continue to be established within easy shipping distance. The above farm has things almost made to order—every acre gently sloping to the south and well sheltered as to the other points of the compass by heavy woods and the lay of the land. (Courtesy of Mr. S. B. Denlinger.)

principles of successful poultry keeping are better understood and stuck to in practice, there will be a great many more large successful poultry farms. (See Fig. 7).

Large poultry farming operations are, however, as yet confined to egg farms and "fancy poultry" farming. Broiler farms and poultry for market farms have never yet made good, perhaps never will make good as long as farmers and others will indifferently raise a lot of poultry at no cost, or caring nothing as to the cost and selling for what is offered. Anyone that can put a few eggs under a hen can usually raise a few chickens—such as they are. Just as anyone formerly who could plant an apple tree could raise apples such as they were. The coming of the scale and the multiplication of other insect enemies has made this latter now an impossibility and the growing of apples seems to be going into the hands of people who make a business of it. This may sometime happen with poultry for market growing. It is going that way to meet the demand for White Leghorn eggs—a sort of trade mark name for any large, perfectly white shelled eggs.

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## INCUBATION AND BROODING

### A PERFECT EGG—A NEW CHICKEN:

Having talked shop (poultry in hours and out hours with many people, has clearly shown the writer that comparatively few wish to hear very much on the topics dwelt on in the two preceding chapters. What they want to talk about is how to raise chicks; how to feed hens to make them lay; how to cure sick chickens, etc. And yet the writer is thoroughly convinced that only those that give heed to and study the problems of poultry breeding and correct management, carefully and methodically, will ever make any success in poultry that is worth while. These things are the foundation to build on in increasing our winter yield of eggs.

Now, eggs are mostly looked upon as food for humans, but we should ever remember, even while catering to the idea that we are producing eggs for human consumption and uses, that the primary purpose of an egg is to produce a new chicken. And just so far as an egg departs from being a new chicken, just so far it departs from being a first class table egg; always excepting the matter of fertility.

When we open up an egg we find the albumen and the yolk. Neither of these are the new chicken. They are rather the soil or the feeding ground for the germ that, too, can be discovered hidden away in a small, translucent spot attached on or to the yolk. This spot should not be confused with the gnarls or twists of albumen that are purposely so to keep the yolk suspended in the midst of the albumen and away from the shell. Provided the egg has been fertilized and is under proper temperature conditions, the minute germ will develop or divide into a number of cells. These again develop or divide and after a little while we have something that looks as if made up of mostly two big staring eyes, and that eventually gives us a downy little puff ball of a chicken,—a living, breathing thing with all its functions and members, ready to start on a life journey for itself.

*There is nothing more wonderful in Nature than the coming forth of this chick out of its prison walls of lime, that barely three weeks before held a mere lot of albumen and yolk of egg.*



Many times the reason eggs won't hatch is ready at hand by merely breaking a few eggs into a saucer. Such eggs! Is it any wonder the germ refuses to live. It may live forty-eight hours; it may develop and live up to the seventh day, or it may even live up to the seventeenth day and yet because the feeding ground was poor it died. It had to die. With congenial warmth and moisture you can sprout cabbage seed in a box of finely crushed glass, but who would expect the tiny plants to develop into full grown cabbages in such soil? Perhaps the egg was good enough so that a live chick emerged from the shell? The contents of an egg may be unsuitable or unbalanced as it were, both as to the albumen and as to the yolk. The chick, made up in greater part from what was gathered from the albumen, may be weak and having further absorbed the contents of the yolk it dies, or dies in the effort to absorb or assimilate it.

*Eggs are perfect eggs or suitable eggs to produce a new chicken just in proportion as man gives the parent hen a chance. Without doubt a hen will rob her own body in an effort to lay good eggs—eggs that are new chickens.*

To put it in another way: it was Nature's intention that every egg should hatch and that every chicken should live. And just in proportion as we work with poultry out of harmony with Nature's laws so we pay the penalty in poor hatches and poor luck in raising chickens. ,

Nor can an egg so weak, so unsuitable or so unbalanced that it will not hatch a living chick be of first class quality as a table egg either in a food value sense or as to flavor. Of course, there are many reasons why eggs perfect in the above sense may fail to hatch or why eggs only slightly deficient in above may in conjunction with other reasons fail to hatch. Among these are

Faulty incubation.

Infection by bacteria either from the nest, etc., or from the stock.

Holding eggs too long.

Low vitality of the male.

Only hens of strong vitality, with proper feed, exercise, housing and care will lay eggs that are likely to be perfect in the sense that they are new chicks.

Thus far we have spoken of perfect eggs only as far as the contents are concerned. And really when everything is right with the hens laying our hatching eggs there is little else we need concern ourselves with. However it is well to consider only such eggs for hatching that are normal in size, in shape and color for the breed laying them. Eggs unduly large should be discarded as carefully as all under-sized ones, although it is always desirable to set large, perfect shelled eggs at or slightly above the two-ounce standard. What applies to size applies to shape. The color, if they are white eggs, should be white. A shiny white is as undesirable as a creamy white. In brown eggs let the color be really brown. No eggs make a poorer show as table eggs than a brown egg that has deteriorated into a yellow egg by careless selection.

Washing eggs is very undesirable in fact, there are many things about

#### TAKING CARE OF EGGS AWAITING INCUBATION:

that needs emphasizing. The first and most important one is never to hold eggs for hatching longer than is absolutely necessary. After



two weeks the deterioration is very rapid and every effort should be made to avoid holding eggs longer than this. Eggs are not merely to hatch but they are to hatch strong, livable chicks. The second is the temperature to hold them in. We will agree with those that claim 40 to 50 degrees is best—if there is a guarantee that the temperature won't go down below 40 some cold night. 50 to 60 degrees is safer in fact, a few days at 70 is much to be preferred to a few days at 30.

Next, the place is important. A cool, dry, dark place is best. A basket or box lined with paper is to be chosen as against a crock or a tin pail. In cold weather eggs must be gathered very frequently. It must be remembered that low temperatures are very destructive to eggs for hatching. Never pack eggs in bran, or chaff or paper on end and try and keep them this way for several weeks. The very shape of an egg would indicate that it was always to rest on its side with the pointed end perhaps slightly depressed. No doubt it is a good practice to turn eggs awaiting incubation, and that just simply transferring them daily from one basket to another is better than mechanical turning with its tendency to merely turn over and reverse.

The purpose of turning eggs is to rest the albumen or relieve the strain thereon, as eggs held too long in one position will eventually be found with the yolk adhering to the shell.

#### GOOD AND BAD NESTS:

The good old way of setting eggs under hens is as yet in no immediate danger of going out of use. It is too good a way. But under our system of poultry keeping, it is not usually advised to set eggs in nests made by the hens. Also, a hen cannot make a good nest unless it is an empty nest, and most hens, when they have laid their clutch of eggs and gone broody, no longer seem inclined to make a nest, but rather accept what they find or is given them. A good nest for a setting hen is in pudding-dish fashion. A poor nest is in derby-hat fashion.

Everything that wears feathers seems to prefer some secrecy about their nesting, and a hen is no exception. Allowed to follow her natural instincts, after finding a secret place she will half stand up and loosen the soil with her toes. Then resting her breast bone on the ground, with some assistance from her wings, she will shape the nest, or raise a slight ridge of earth around her with her toes slightly the lowest and in the middle. Now, she will line it with anything within reach like leaves, litter, etc., using her bill for this purpose.

Eggs under a setting hen must have an opportunity to "travel" safely. They can only do this in a nest that is comparatively flat as to the bottom. If in a nest built derby-hat fashion, every egg will be pressing with all its weight on every other egg, and pressing too to the common centre or the place for the feet of the hen. Is it any wonder when eggs are to travel in such a nest something has to break?

That eggs are constantly being shifted, turned and changed (or travel) as to position in the nest, can be proved by anyone for themselves. That eggs won't hatch unless so shifted or turned can also readily be proved. The setting hen is forever moving the eggs, probably for purposes of her own comfort. She can hardly be aware that it is good for the eggs.

If the nest is right and only firm-shelled eggs have been carefully chosen, there is little danger of broken eggs. But if there is a broken egg the matter should be attended to at once, unpleasant duty as it is. The escaping albumen of a broken egg will coat adjoining eggs, acting as a varnish and effectually destroying the embryo chicks. In bad cases it may even glue adjoining eggs together or glue them to the hen, making an already bad condition worse. There is no help for it now. All coated eggs must be washed in warm water with a clean rag, one at a time, and quickly dried. Evaporation from a wet egg is rapid, causing quick and dangerous cooling. All besmirched feathers had best be pulled out, as this is easier and more satisfactory than washing; and the nesting material that has been soiled, replaced.

A fruitful source of broken eggs is a nest the hen has to jump down on. It ought always be so low she can walk on. Another reason for broken eggs is a clumsy or over big hen. Such hens will break eggs no matter what the nest is. Two hens getting on the same nest or a nest that laying hens can find access to is another source of broken eggs. It is a great deal easier and more satisfactory to so fix things that no eggs will be likely to be broken than to attend to a lot of hens frequently breaking eggs.

Only in very cold weather is there any excuse for a deep nest. When the temperature is hovering around the zero point the nest must be well packed, fairly deep and thick. Soft meadow hay or straw lined with hay chaff or lawn clippings are fine for such a nest. Excelsior is the very poorest sort of nesting material for a winter nest.

#### STOLEN NESTS

are usually on the ground, fashioned after the manner described under the previous heading, and a sort of nest we do well to copy. Whenever a hen steals her nest, it seems she will leave and return to same with a care and circumspection rarely found in other setting hens. That the eggs in stolen nests hatch so uniformly well cannot in fairness be all credited to the nest. Only vigorous, active hens will steal their nests and they will steal them only in reasonable temperatures or really, warm temperatures, which may be a remnant of the instinct inherited from the wild fowl, a habitude of a warm climate.

#### SETTING THE HEN:

If we want early laying pullets, we must have our chicks early, so we must set our hens long before the season of stolen nests. Must set them sometimes even before eggs are at their best for setting, which is only after Spring has fairly opened and grass has begun to grow. Even if only one hundred chicks are to be raised, there should be some system in setting hens, and some equipment for same. Some call this equipment a natural hen incubator. The equipment may be merely some empty room in some outbuilding. An upstairs room is too cold, and if not too cold, too hot and always too dry. There may be a series of low boxes all exactly alike side by side. If side by side and all open there is not much danger of two hens occupying one nest, while the eggs in another nest are chilling.

Four or more hens should then be set at one time. If possible, when there are not to be a large number of chicks, all the eggs for the season should be set on one day. But rarely is this possible, so we set

as many as we can, and at the end of seven and fourteen days' test out all eggs that show that they will not hatch and re-set the hens; also, what additional broody hens we may then have. Thus grouping the hatching and having all chicks as nearly as possible one age.

Where hatching by hens is to be done on an extensive scale the only plan is to fit up a room for this purpose, and attend to all the hens regularly every day, including lifting from each nest and seeing that they return. But this is a great deal more work than attending a machine incubator, and is only warranted where regular and extensive pedigreeing is being done, or under other exceptional conditions.

#### CARE OF BROODY HENS:

Broodiness is a natural instinct and can be made to almost disappear by man's treatment, breeding and handling of the hen. But this process must necessarily be very slow; even when made an especial object, encompassing many years. Broodiness should always be treated with great patience and kindness. Any other treatment can do no good and must do much harm. The sensible way is to remove a hen showing signs of it the very first night, putting her in new quarters with plenty of food and water and no nests or anything suggesting nests in sight. With a persistent setter, a lively young male in charge will help her to forget broodiness and get back to laying.

However, it is practically certain that in the long run we lose nothing if we allow individual hens of the American and similar classes, moderately inclined to broodiness, a chance to incubate a clutch of eggs and raise the chicks, particularly in late Spring. If given good treatment, (and it is as necessary that the hen have good treatment as the chicks if the latter are to grow well) which includes free range with her chicks, this "rest" is sure to show an increased yield of eggs, more than making up for those lost while performing her maternal duties.

#### INCUBATORS—GOOD AND BAD:

The best incubators made, due to keen competition among manufacturers and excessive advertising bills, are none too good and it is often a very costly mistake to buy a cheap machine simply because it is cheap. It should be carefully considered that a cheap machine may spoil enough eggs in one or two seasons use to more than pay for a good machine. Again a good machine will not go to pieces after a few years' use, in fact can be a good machine for many years. Also, a good machine, doing consistently good hatching throughout a series of years, can be re-sold with a clean conscience, whereas, a cheap machine must go on the wood pile or someone must act the rascal.

However, let it be understood that cheap machines do sometimes make remarkable hatches and that testimonials to this effect can be perfectly genuine. Usually, if not always, these good hatches are due to a combination of highly favorable circumstances. Chief of these are the eggs used. Eggs may be so "hatchable," so full of vitality, that they will hatch almost anywhere, in anything. The writer knows of one instance where some eggs hatched in a common box, with the heat and fumes of the lamp entering directly into same.



There are two decidedly different types of incubators. The one type known as hot air and the other as hot water. Using these mediums to heat the egg chamber, there are advantages claimed for both. The writer has had experience with quite a range of machines of both types, some of them no longer manufactured, and while it may be that his experience with hot water machines was unfortunate or perhaps even unusual, his leanings are strongly in favor of the hot air type.

Time is yearly considered of more value and we want an incubator first of all that will give us the largest per cent. of livable chicks the longest series of years for the least expenditure of time and effort.

Whether there is one best incubator we doubt. Many people believe they know which is the one best and will cheerfully impart their knowledge; but the irreconcilable thing is they don't agree on the same make of machine. There should be national and state tests, so conducted as to be absolutely reliable and above suspicion of bias, of all the machines offered on the market and the results published. These tests would cost a fraction of their value as a guide to the buying public. A public that is yearly buying more incubators and bought this year enough to make a total that to the uninformed is hardly believable.

Also, there seems to be no known best way of running an incubator. However, it is usually very foolish if not even ridiculous for a buyer not to scrupulously follow the directions for operation accompanying the machine. A little reflection must convince anyone that it is directly to the manufacturer's best interests to have his instructions adapted to and correctly given for his make of machine. Hence, every effort should be made to fully comprehend the given instructions, and if anything is not understood, or difficulties arise not taken care of in the printed instructions, the thing to do is to write the maker. If after a thorough trial of the maker's way of operation, results cannot be obtained, there is then still time to use a different method, or one's own method.

The question as to whether incubators or hens are best is often put and in various ways. Undoubtedly our best incubators even are not equal to natural incubation. Not enough is yet known of the science of artificial incubation to have made an ideal incubator possible. Some day we may have such incubators and then the day of natural or hen incubation will have passed. On the other hand on big egg farms, or in any poultry operations where a specialty is being made of market eggs and a consequent large number of hens of non-setting varieties are being kept and annually or at least bi-annually need to be replaced, the incubator becomes an economic necessity.

There is less work and less expense in hatching and brooding chicks artificially, and provided the parent stock is being so kept as to conserve vitality and it is proposed to raise the chicks with this too always in mind, the present day poultryman can afford to snap his fingers at what loss of vitality his chicks may suffer from being incubator hatched for many generations. The ordinary farmer with a mere farm flock of chickens can, however, feel he is not losing much if anything by having no improved hen machinery on his place in the way of incubators and brooders, for with his limited poultry operations and a variety of poultry that usually belong to the setting class he has the best way, for him, ready at hand without extra expenses.



In the previous chapter much was said directly and indirectly on the conservation of vitality and the high importance of same. To further directly emphasize this under "Incubation" let us state, that the one big trouble in getting good hatchers is the lack of this same vitality mostly brought about by keeping chickens in jails and jail yards. And that soil contamination again is the one big evil that we have to guard against not only as to the parent stock but as to the chicks most especially. And if as it seems the trouble in getting good or satisfactory hatches is on the increase or that we have more complaints of poor and of unsatisfactory hatching; then it is likely that this is not so much due to the increased use of artificial incubation and brooding both, as *it is to the increased number of people who are purposing to raise and keep chickens on the intensive plan.*

Within the last few years a new sort of incubation has sprung into existence making possible simultaneously a new phase of profitable poultry keeping and one directly affecting poultry farms engaged in producing market eggs. This is the so-called "mammoth" incubator or the ten thousand or more egg capacity, incubator. Heretofore incubators had been almost universally lamp-heated, but in these large machines hot water pipes are used with coal in the heater for fuel. It is found that even less than one cent's worth of coal per day will do per thousand eggs, and as these machines are divided into compartments each hold from a hundred to a hundred and fifty eggs, eggs can be set and be hatching every day of the week in this kind of machines. The use of these machines has made possible an enormous trade in day old chicks and on large egg farms where the daily yield of eggs is large, several such machines may be in use turning eggs, which, as market eggs, would have to compete with the glutted Spring market, into day old chicks. There seems to be no end to the amount of this kind of chicks that can be sold. And if the parent stock is all right and the chicks are "livable" chicks, it is usually just as cheap for the small poultry keepers to buy these day old chicks, as to spend the time and effort in hatching them at home.

#### THE INCUBATOR CELLAR:

A great many incubators fail to do themselves credit because they are poorly located. It is a pretty safe guide and rule not to locate an incubator anywhere that would be considered a poor place for setting a hen. For instance, a dark, damp, foul smelling cellar is no fit place for eggs in a machine. One over-dry and over-heated by a furnace is just as hard on the eggs. A cellar is usually chosen because the temperature is likely to be equable or to vary least as a result of outdoor changes of temperature. Outside of this a great many cellars have nothing to recommend them.

*An incubator room should be fully as sanitary as a hospital ward or an up-to-date dairy barn.*

#### AN EGG TESTER AND SOME STUDY OF EMBRYOLOGY:

Anyone setting even a few hens should have a tester of the sort that was in mind when this sub-heading was written—one that will assist in observing the changes going on during incubation and also enable one to remove unfertile eggs and dead eggs or, eggs that will not hatch.

Practically the same sort of tester is used in commercially "candling" eggs. In its simplest form it is had by making an oblong box of thin boards without top or bottom, eight or ten inches square and fourteen to sixteen high and this stood over a low lamp. A three-inch square hole should be cut in one of the sides opposite the lamp flame and this hole covered with soft leather or heavy dark cloth that in turn has had a hole cut into it, about the shape and size of a very small egg. A reflector attached to the inside of the box opposite this hole will increase the efficiency of this tester which of course is for use only in a darkened room. By holding an egg up to the hole and slowly turning it, after a little practice, practically all stages of incubation can readily be recognized.

When first starting the use of an egg tester, an egg should be carefully examined before same and then broken into a saucer. Even after some little practice when testing a batch of eggs, it is well to lay to one side all doubtful eggs; then when through with the rest to go over these one by one and breaking them into saucers. In this way one will quickly become sure of himself and can do testing with correctness and great rapidity. It is, of course, very much easier to learn with white shelled eggs.

Eggs can be tested by the sense of touch alone. After the tray has been out of the machine some little while or the eggs have been out from under the hen a certain time, depending upon the temperature, the hatchable and non-hatchable eggs can readily be separated by holding them one by one against the closed eye lid. Some use the tongue for this purpose. If too long a time has elapsed since the eggs were removed from incubation temperature, they will all be cold alike and this method of testing cannot be used. This test works best the latter part of incubation when the animal heat is strongest, but persons with a sensitive touch can use it as early as the seventh day.

Candling, however, before some strong artificial light after the manner first indicated is the only way we can get any knowledge of the physical condition of our eggs under incubation. Placing some eggs under incubation, at the end of twenty-four hours, if the shells are white and clean, they will before a strong light already show some change to a careful observer. The yolk will appear tinted or shaded. This condition will continue to be emphasized until at about the end of the third day when embryonic development will begin to be noticeable. After this time if care is taken in lifting an egg off the tray to keep the side which lays uppermost directly opposite the side nearest the test light, or in placing the egg directly in this position from off the tray, observation of the embryo will be much facilitated as it cannot be readily observed unless uppermost, its constant normal position under incubation.

In testing eggs, most operators will pay no attention to this little point but depend on revolving the egg until they find the embryo on top or in position to be discovered. Infertile eggs are usually termed "clear" eggs. They look like new-laid eggs and no amount of revolving before the test light will show up anything but the characteristic appearance of such eggs. After five days the embryo will show some independent motion and this becomes very decided in good, strong eggs by the seventh day. In practice, eggs under regular incubation are usually not tested until the seventh day and even this may be early for very dense, brown-shelled eggs. An expert can readily test white

shelled eggs by the fifth day. The appearance and amount of the veining, the liveliness of the embryo as it plunges into and out of sight and to a slighter degree the air cell gives the expert operator even at this first test some hint as to what sort of hatch he will have.

The study of the embryo development is very interesting, and can be readily carried on by anyone with a good pair of eyes. Eggs should be carefully broken daily beginning at the end of the first twenty-four hours. This should be done into saucers of warm water, heated so it will be at or about 103°. This study is of the utmost importance to those wishing to hatch chicks artificially, and is really the only way anyone can become a skillful incubator operator.

Of particular value is the careful examination and study of all the eggs that fail to hatch under artificial incubation. It is taken for granted that under such incubation all unfertile and all dead eggs have been removed at the seventh and fourteenth day as they should be. Then if any except a very small per cent. refuse to hatch live chicks it is time to know the reason why. There are so many chicks that die in the shell between the eighteenth and twenty-first day,—but they do not die without a reason. And the operator, by an examination of the unhatched eggs and a general knowledge of the breeding stock and the incubation, must be able to locate where the fault lay. *No outsider can do this for him.*

For the poultryman hatching with hens, the value of the tester comes in by showing which eggs should be removed. This removing of non-hatchable eggs always gives the rest of the eggs a better chance and should never be omitted. The prejudice or superstition against handling eggs set under a hen has nothing to uphold it. If the place where the eggs are being tested is comfortably warm and the hands are clean no possible harm can result even though plenty of time be taken to the work.

#### VENTILATION AND MOISTURE:

That the air should be pure, sweet and sanitary in the incubator room should be the first consideration. The scheme of ventilation for the machine itself has usually been arbitrarily provided for by the manufacturer. The exact amount of ventilation is undetermined. Probably the broad principles are that the air must be as still and as pure and plentiful as possible. But this is mechanically difficult to bring about and to offset the drying effect of moving air, moisture is supplied by evaporation from a tray or otherwise. Non-moisture (so-called) machines it is to be feared, get along without applied moisture by shutting off the amount of air.

Moisture is very necessary to growing chicks, and it is a question if it is not vital to the embryo development as well. The matter of ventilation and moisture is very closely tied up with that of temperature. It is necessary, in order to have an even temperature in all parts of the machine, for the machine to stand on a level. That the grade of oil used be good (most of that used is execrable) and that the thermometers be right, if the temperature is to be maintained. Many incubator thermometers go wrong and if a thermometer is off only two degrees in its reading, there is little chance of doing much hatching. A drug store or the family physician can readily ascer-



tain if an incubator thermometer is registering right by testing it alongside a clinical thermometer in a big bowl of warm water. It should be compared at the 100, at the 102, 103 and 105 reading. Machines in use too develop cold spots and cold sides or ends. These can sometimes be remedied by re-adjusting the level of the machine or by over-hauling the heating tank and the flues. Sooty flues, or dust or cob-webs in hot air machines, or lime deposits from hard water in hot water machines are sometimes the unsuspected reasons for faulty and uneven heating of the egg chamber. Again, an exposed incubator room or one with thin walls may leave enough of the icy blasts of February and March in to cause certain ends of every machine in the room to be cold. This is too often unsuspected, particularly when only one thermometer is used to a machine.

With a large per cent. of good, strong germs in a machine every effort should be made to heroically keep the temperature from going beyond the 103 mark. The best and strongest thermostats made will not take care of the temperature under these conditions, save by frequent adjusting. A favorite and very successful method with the writer has been to keep the temperature under control as indicated, and with plenty of moisture showing on the glass in the doors, as the first chicks break shell, the temperature is urged up to 105 and even 106. The eggs must have been well ripened and under these conditions the chicks will hatch, like popping corn and comparatively few or no chicks stick.

Nothing is more exasperating or more unsatisfactory than a hatch that hangs fire for two or three days.

#### COOLING:

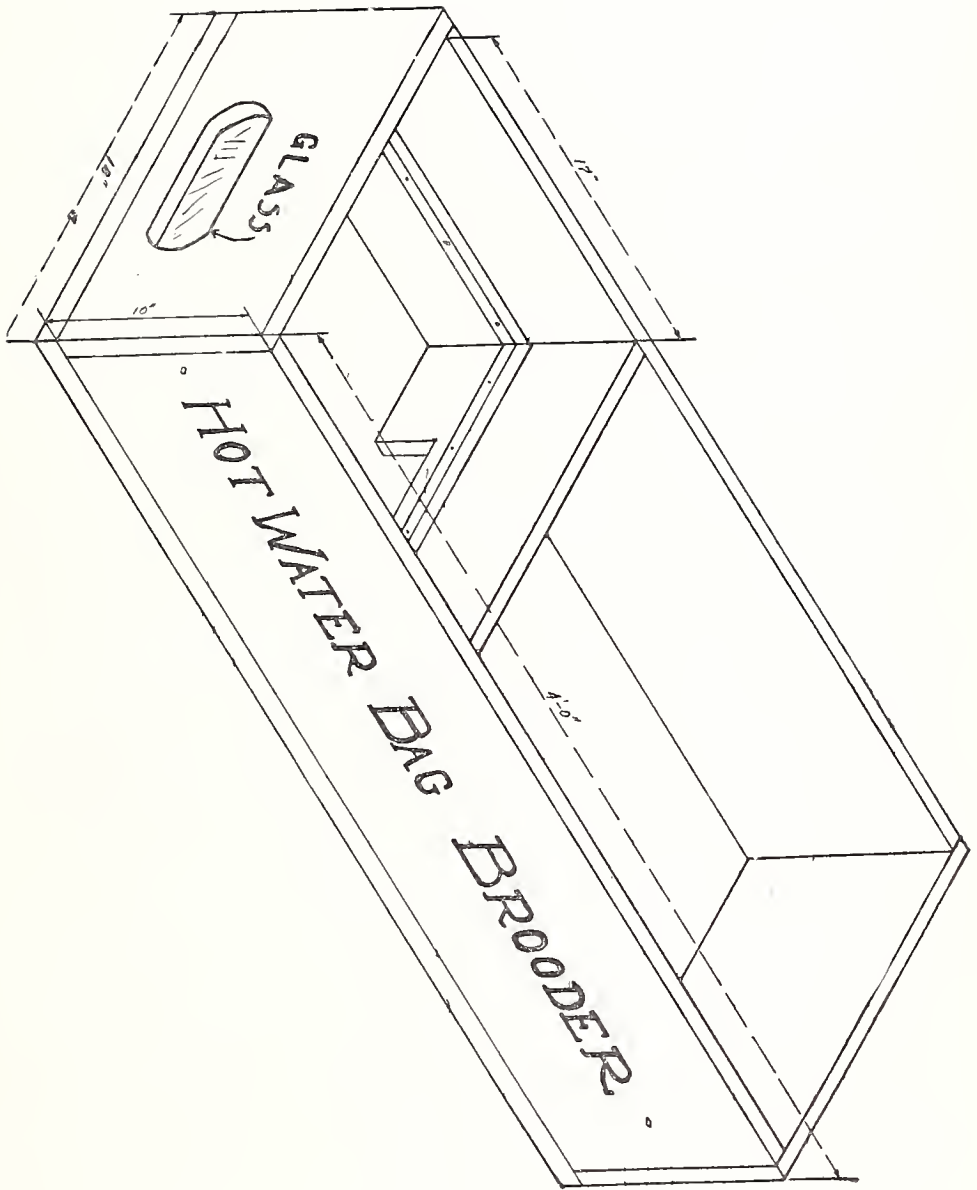
Cooling is important, but something many operators seem to be afraid of. Excessive cooling may retard the hatch, but when this occurs merely as an accident or occasionally, there is nothing in the writer's experience to warrant the belief that it materially hurts.

It would be interesting to make extended experiments to see just for how long a period eggs under incubation could be retarded and still hatch. They have been known to hatch here as late as the twenty-sixth and the twenty-seventh day; in warm weather, on the other hand, if new laid eggs were slipped under incubation while yet warm they would hatch, if free range Leghorn eggs, as early as the close of the eighteenth day. This under hens where forced heat was impossible. When the eggs were right and the temperature, ventilation, moisture and cooling were correctly gauged, chicks from brown shelled eggs should be all out the morning of the twenty-first day, while white-shelled eggs should be all out eighteen to twenty-four hours earlier. Here is one of the reasons why white-shelled and brown-shelled eggs should not be set simultaneously on the same tray.

In pedigree hatching where of necessity some of the eggs, as would occasionally happen, would be quite old before a certain hen would have laid enough to make the number for setting it was frequently noticed that the latest laid eggs always hatched first and the oldest laid last.

*Perhaps the most frequent error made by beginners in running incubators is that of over-attention.* A good incubator during the bulk of the time required for any one hatch does not need looking after more than two or three times daily. Will in fact be likely to do its best work when thus left alone. This is a lesson very difficult for





Plan 2. A splendid little home-made heated brooder to take care of 15 to 20 chicks or to be used as an emergency brooder or as a temporary nursery brooder. Full directions how to build and operate will be found in the text. The illustration is wrong in showing only a small opening for slitted curtain. Same should extend across from wall to wall.



many people to learn or to appreciate. On the other hand carelessness and irregularity in attending to a machine can result only in partial or complete failure. Attending to incubators or to what hens may be setting should be made part of the regular routine of the day's work and should be attended to with methodical regularity.

#### ARTIFICIAL BROODING AND FIRELESS BROODERS:

Some makes of incubators make fairly good first day nursery brooders for newly hatched chicks, but with most machines the quicker they are taken out after the hatch is over the better.

*Chicks must be kept quiet while still in the incubator.*

Any considerable moving about or "crying" should be viewed with alarm and every effort must be made to bring about quietness. Darkening the door or supplying more ventilation are usually what is needed. Newly hatched chicks under a hen are as quiet as death and have, almost at once they are dry, sought a place in the nest where they could get plenty of air. *One of the great causes of mortality in incubator hatched chicks is the forced restlessness induced by the machine conditions.*

The first and prime requisite of a newly hatched chick is that quietness and that comfort which will allow it to spend most of its time in sleep. If little chicks can be kept fairly quiet the first two or three days, whether incubator or hen hatched, it is usually pretty certain that they will live. With a little planning this is fairly easy during cool weather, but with hot weather is more difficult. But easy or difficult it is the condition that is desirable and that should be planned for.

Under "artificial brooding" we have two methods. In the one the brooding is done by a heated brooder and in the other no heat is used save that generated by the chicks themselves. A person can choose either. Some persons make a failure using heated brooders and hence most turn to a non-heated brooder (Plan 1). And even if while this is the poorer of the two, if by using it they can succeed in their poultry operations there is justification in using it. Much has been made of these non-heat or "fireless brooders" within the last few years, and while we will freely admit that the exploitation of same has made it possible for more people to rear chicks successfully, artificially, there is no ground for the great claims made for this kind of brooding—excepting for those who for one reason or another cannot succeed with the better, or heated brooder, method.

Fireless brooders are not new. They are in effect but the repetition of the basket or box, covered with a shawl or piece of old quilt and set back of the kitchen stove for mothering an orphan brood of chicks that old folks remember seeing in the kitchen on the farm when they were boys. The fireless brooder may do all right for this ancient purpose or for some one raising only a few chicks, and with the time and the willingness to be slaving after them and for them. Chicks don't like them and have to be literally trained to use them by putting them back in them times out of number. They are not for use in cold weather or for cold climates, and attempting to use fireless brooders in a cold outdoors usually results in stunted chicks. To the virtually naked little chicks supplied heat, in a large measure, is food and is life. If the chick has to use an undue measure of what it

eats in keeping up bodily heat (and in heating up its bed chamber) there can be little left for growth and development. Hence, it may happen that midwinter chicks in a fireless brooder at four weeks old may be scarcely larger than the day they were hatched. At least some readers of this must have noticed this stunting in growth in very late Fall or winter hatched chicks that were poorly brooded by a hen.

With a heated brooder, chicks may run out the coldest day; and returning to the warm hover be comfortable in a few minutes. With a cold brooder if chicks are left out they have nothing to go back to but some icy cold blanket. Therefore fireless brooders should not be seriously considered except for warm weather. Not that it can be denied but what some people have succeeded in raising good chicks in fireless brooders in cold weather,—at what price of labor, bother and fuss is best known to themselves.

*The little chick has always been rightly persistent in clamoring for a warm mother to get under and no man-made claims or "contraptions" to the contrary will ever satisfy it.*

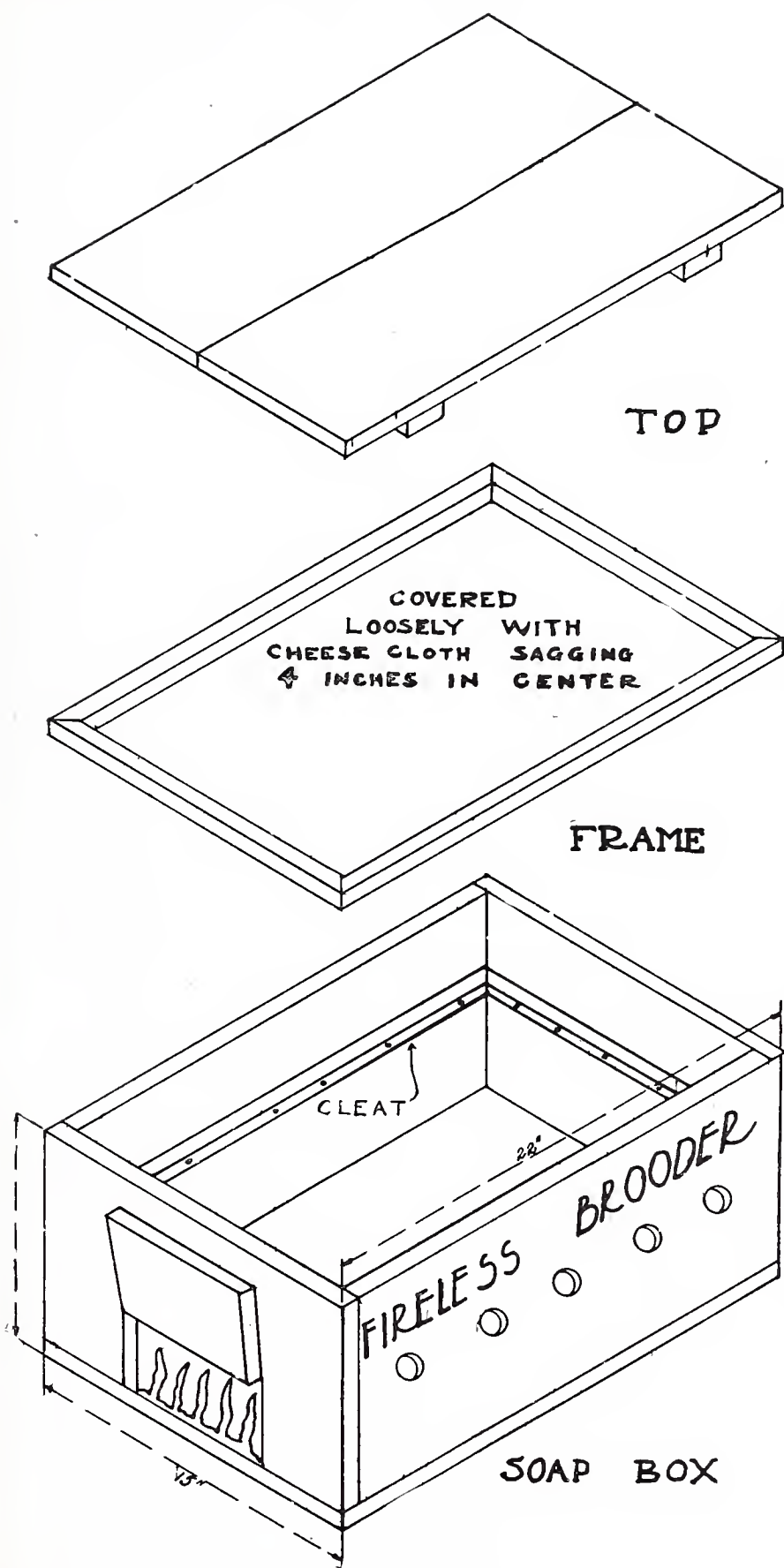
Our baby chick has its sleepy nerves, its nerves of warmth, apparently bunched on its back and it would seem to be best satisfied by getting this back against something warm—getting its warmth by contract heat. Hence, we have contact heat, heated brooders, although not in use to any considerable extent.

The popular brooder of this period is one that will supply plenty of heat no matter what the outside temperature; and whose heat under the hover is top heat; that is roomy enough to give the chicks some indoor place for exercise; that has a hover so constructed that there will be no danger from crowding under same and that can be adjusted in height to the growth of the chicks; that has forced ventilation under the hover and outside spacing and ventilation so as to allow of several temperatures. Or, in the other words; the best system of artificial brooding we have to-day is one that supplies plenty of heat, ventilation, room and a chance for the chicks to select their own temperature.

The heat may be from lamps and be by the warmed air method, as it usually is in individual or small brooders—or from regular stove heaters through hot water pipes, as it is in large brooder houses. There are some objections to the latter plan as usually installed and not a few large brooder houses of late years have been equipped with individual brooders or hovers.

The main thing to watch in these brooders is the temperature and its close twin here—ventilation. And because certain poultry people and others could not master the art of regulating or using these two, they could make no success with heated brooders and having found they could get along with non-heated ones or "fireless brooders" they began to claim and still claim that such are the one and only brooders. The temperature beneath the hover at the height of the backs of the baby chicks should be a fully 100° in ordinary Spring weather and in severe cold spells not less than 102° for the first few days, and it should never go below 95 the first week. A temperature as high as this under the hover will in a well built brooder give a fairly comfortable temperature in that part of the brooder where the hover is located and the chicks can after a day or two use same freely. In fact after chicks are three to four days old they should not only be allowed to use the coldest section of the brooder but be encouraged to do so.





Plan 1. Fireless brooder made out of an ordinary soap box. One of the advantages of the fireless brooder is that it can be readily made at home and at little or no expense. The heat cushion for this is preferably a bag of ordinary chicken feathers that have been cleaned, of a size to rest on the frame and fit the box. Or, a woolen cloth or blanket hung in short folds on the frame may be substituted, making sure there will be sufficient ventilation.



After they thoroughly know the hover and the heat, they should be given a chance at outdoors. Even snow on the ground should be no cause for the delay in this. The snow can be shoveled or swept away and if there is a sunny exposure, as there should be, and good drainage, the conditions will be all right. *Cold won't hurt a ten-day-old chick if it has a warm place to run to and knows where to find it.* And the colder the weather, the quicker they learn. If small chicks won't leave the heat to exercise and to play there is something wrong. The chances are that what heat there is is too low or was too low and they acquired the habit of hugging the heat. Or, the ventilation may be deficient or the food too plenty and too easily got at. No matter what the reason it should be corrected promptly and the chicks got so they will during daylight hours use the heat only to warm up, and not to loaf at.

*A ten-day-old chick should have no other object in life but to eat, sleep and exercise.* Without the latter, or exercise, there can be no good appetite, and no normal sleep. Without plenty of exercise and plenty of cold fresh air there can be no good digestion and chicks without either soon sleep too much—not the sleep such as chicks normally enjoy, but the sleepiness of slow poison. A chick soon tires. It does not want exercise and it does not want to eat at this stage without frequent rests, and if the temperature under the hover is high enough it will find warmth, sleep and rest here quickly and often. Here is where a brooder heats a hen in the cold, raw spring-time weather so common to this State.

If it is of importance to keep the temperature high, *it is still of more importance that it never be too high.* The danger time for this is at night in the absence of the attendant and in the middle of the day with the sun shining, *if things are so the chicks can not get away from the heat.* Too much heat is very weakening. A small chick is a fairly hardy little creature and thrives under wholesome “roughing it.”

It is very easy to waste too much time in attending an incubator, but it is the exact reverse with our present day heated brooders. They can not be looked after too often. They must be visited the last thing at night and the first thing in the morning, and the best guide as to whether they are being run right is the chicks themselves. If right you can “see them grow.” If right, things will be very quiet at night and they will be spread out nicely with their heads resting on the floor. A chick can be perfectly trusted to know the temperature best for it—it will not be satisfied or quiet with any other, and not be slow to show this by its actions. The heat under the hover should be reduced very slowly, but after ten days the ventilation and the chance at the fresh air of all outdoors should be rapidly and largely increased. This to be gauged some little by the state of the weather.

Second-hand incubators and second-hand brooders as purchases are rather dubious investments. They are most frequently for sale after having been failures in the hands of some one. In either incubators or brooders, they may have been overheated and the flues be full of soot. They may have been left in a wet cellar or in the weather the year round and be warped and lacking ventilation where none is desirable. But worst of all either may be bacteria infected and woe to the buyer of such second-hand improved poultry machinery. Such machines may be thoroughly scrubbed and re-scrubbed with hot water

and some strong disinfectant. Not a nice job. One not good for the machine either. And a job that after all may not have been thorough enough. A better way than this scrubbing is to use formaldehyde as directed for ridding poultry houses of disease germs and lice in the next to last chapter.

Buying an incubator or a brooder that has been a failure in some one else's hands is equivalent to saying you are smarter than the other fellow—better not risk it. New machines are none too good and, having bought good ones give them good care. Do not let them be come disease germ infected by ever allowing any sick chickens in them, or by shutting the sun away from them or out of them. Yearly as soon as the season is over, store both in a dry, clean place.

The floor of an incubator or of a brooder need never become soiled, in fact should be like new after the season's use. A pad made of ordinary burlap that has been thoroughly washed should fit the floors of the incubators and after each hatch these pads should be boiled, sunned and dried. The brooder floor should never be without a good covering of something. For the first week nothing is so good or so safe as commercial cut clover. A newly hatched chick in a brooder is a foolish critter and will pick up and swallow sawdust, small particles of planer shavings, sand, etc., in sufficient quantities to kill it outright or injure it seriously. When a little older they will learn to avoid these things. Next in value to cut clover is cut straw or litter from the hay-mow, always provided this is free from taint of mould or mustiness. After the chicks have attained some size, a clean, sharp sand is the best covering. These cut clover and sand covers make cleaning the brooder easy.

A handy small heated indoor brooder and one that closely approaches ideal brooding can be readily made by anyone and at practically no expense. (Plan 2). An ordinary box of almost any shape or size can be used, or one can be made of some thin boards obtained by taking apart some box. If the box is especially built, the dimensions and shape of an ordinary chest, except the depth which need not be over ten inches, gives a desirable box. Those the writer has are made of half-inch boards from hat-cases and are eighteen inches wide, forty-eight inches long and ten inches deep. Eighteen inches from one end, a cross piece five inches wide is set in flush with the top. To this a slitted curtain of some woolen stuff is tacked to keep the heat in and allow the chicks to go in and out. The curtain should clear the floor. The position of the cross-piece, provides a heat chamber eighteen inches square. Into this square is tacked a piece of thin muslin so put on as to allow a sag in the centre. On this muslin is laid a two or three quart rubber hot water bottle filled and closely covered with folded newspapers or a woolen pad. Crumpled newspapers after the method of a homemade fireless cooker do fine. The purpose is to prevent any loss of heat from the hot water bottle save through the muslin diaphragm. To use this as a nursery for baby chicks, first put from one to two inches of cut clover on the floor, leaving about a two-inch space between the clover and the lowest point in the sag of the muslin. Now fill bottle with hot water, cover and your nursery brooder is ready. *If little chicks could talk they would unanimously vote this the very finest sort of brooding.* They are perfectly contented with the soft constant warmth and can push up against the soft rubber bag just like against a real mother. In



use it is perfectly safe to fill the bottle even with boiling water for the muslin will prevent any burning. When freshly filled the chicks will rest along the sides and with their heads and often bodies half-way out from between the slits in the curtain. As the temperature of the water goes down they may bunch directly under the bottle. With the outside temperature at 60, filling in the morning and the last thing at night will suffice. If colder, the water may have to be changed more frequently. The space eighteen by thirty is for exercise, and it, too, should have cut clover on the floor and all dry grain fed therein; in fact, the chicks will enjoy working in this all day long, babies though they be. A frame covered with inch poultry mesh wire should be fitted as a cover to keep out rats, cats, etc. Or, even a roof can be built over it and the brooder used as an outdoor one. If a small hole four by six is cut in one of the walls of the heat chamber and a piece of glass fitted over it, thus letting some light into this portion, it will require no teaching of any sort to get chicks to take to this brooder. As they grow the depth of the cut clover under the water bottle should be reduced, in fact, after two or three weeks a heavy sprinkling of sharp sand is better. However, this nursery brooder is only adapted for poultry keepers raising a limited number of chicks, or for use in emergencies or as a nursery only.

Artificial brooding of chicks, when chicks through mistaken kindness or excess of care are given no chance to run on the ground, most frequently develops so-called leg weakness. The cure is moisture. Either wetting down the sand of the brooder floor several times daily or providing a shallow dish of water for the chicks to wade through every time they go in and out. Chicks ten days or over have no business to be shut on a board floor, and "leg weakness" is often Nature's first and emphatic protest against this kind of man's inhumanity to chicks. At the first sign of leg weakness, if they are got on the ground, the cure is quick and sure.

Properly handled, artificial brooding will, so far as the eye can judge, beat natural brooding during the early Spring months in this climate. Probably the hen in domesticity and under the altogether artificial management of man is not the equal of her progenitor, the wild jungle fowl, in mothering her brood. And while probably there is something in the notion that a hen imparts animal magnetism (some hens would seem to do the reverse or rob their chicks) to the chicks hovering against her naked breast or body, it is certain that a great many hens, even under the most painstaking handling and management, unduly worry their broods and will not sufficiently brood them. This is the most noticeable during our frequent raw and cold early spring days—the days when we must have the chicks that as pullets are to be matured and be laying in large numbers by early November.

Therefore, artificial brooding at its best, will beat Nature. It will allow chicks to grow better, more uninterruptedly, and more strongly than with hens. Cockerels will crow earlier, and be ready for market earlier. Pullets will grow faster, more evenly, mature quicker and be as hardy as hen brooded. And yet, in spite of the fact that these assertions are true and can be maintained, there is a constant cry, almost reaching a wail—"we can hatch chicks all right artificially but somehow we fall down on the rearing." It would seem that the

"knack" in raising little chicks is not so readily acquired, and until it is we will have an ever present check on an over production of winter eggs.

Some one has pertinently said: "Where women are interested and give their attention to the chicks they are almost sure to do well. Women are not only more painstaking than men but they take a great deal of pleasure in seeing the baby chicks are comfortable and happy. And lots of men owe their success with poultry to the gentler sex without giving them due credit."

Finally, many of the superior merits of the machine brooder, disappear with the onward march of Spring. And with settled warm weather there is no artificial mother made that will equal the natural mother as a rearer of superior chicks and layers. With warm weather the constant and steady heat of the artificial mother loses much of its attraction and chicks seem lost—often tired and "dopy." The correct ventilation and heat become doubly difficult and the chicks, too, miss the mother hen to take them far afield.

It is an interesting fact to note that chicks brought on a place where there is no adult poultry and reared in an artificial mother, instinctively do all the things their brothers and sisters, reared the old-fashioned mother hen way and running with other adult poultry, will do. They need no teaching to learn to eat, to drink, to scratch, to dust, to stretch in the sun, to roost, to crow, etc. In the acquisition of these things they do not miss the mother hen, but when it comes to taking advantage of the warm sun and green fields they must needs have the mother hen as a leader, guide and protector.

#### BROOD COOPS:

Just when separate coops or shelters were first supplied for the needs of a mother hen with her brood of chicks, is lost in the history of bygone days. And it is quite immaterial as to whether the A-shaped coop or the barrel coop were first used. Both have seen many years use and as makeshift they were certainly an improvement on no coop at all. Also in warm weather they serve their purpose tolerably well. The barrel coop has the merit of being economical both as to cost and time to make it; all that is required being the barrel, a few slats or sticks driven in the front and some old oil cloth or rubber blanket as a cover—even this latter is often dispensed with. But it makes the poorest sort of coop, in fact, with chicks in it that are worth while, enough chicks are lost to make it a very expensive coop in use.

The A-shaped coop has one advantage, it allows the maximum floor space possible and when without a board floor, as it usually is, it gives an opportunity to place the chicks on new ground every few days and does entirely away with all cleaning.

But during the early Spring months, the months it is absolutely necessary to have the chicks out that are to begin laying in Fall and be winter layers, a brood coop in Pennsylvania should always have a board floor and be so built that the sun can readily reach every inch of the floor and as much else of the coop as possible. The shed roof or single slant roof is the best and cheapest style and should above all else be rain proof. To be this the roof must be covered either with some sort of roofing paper kept well painted or with tin.

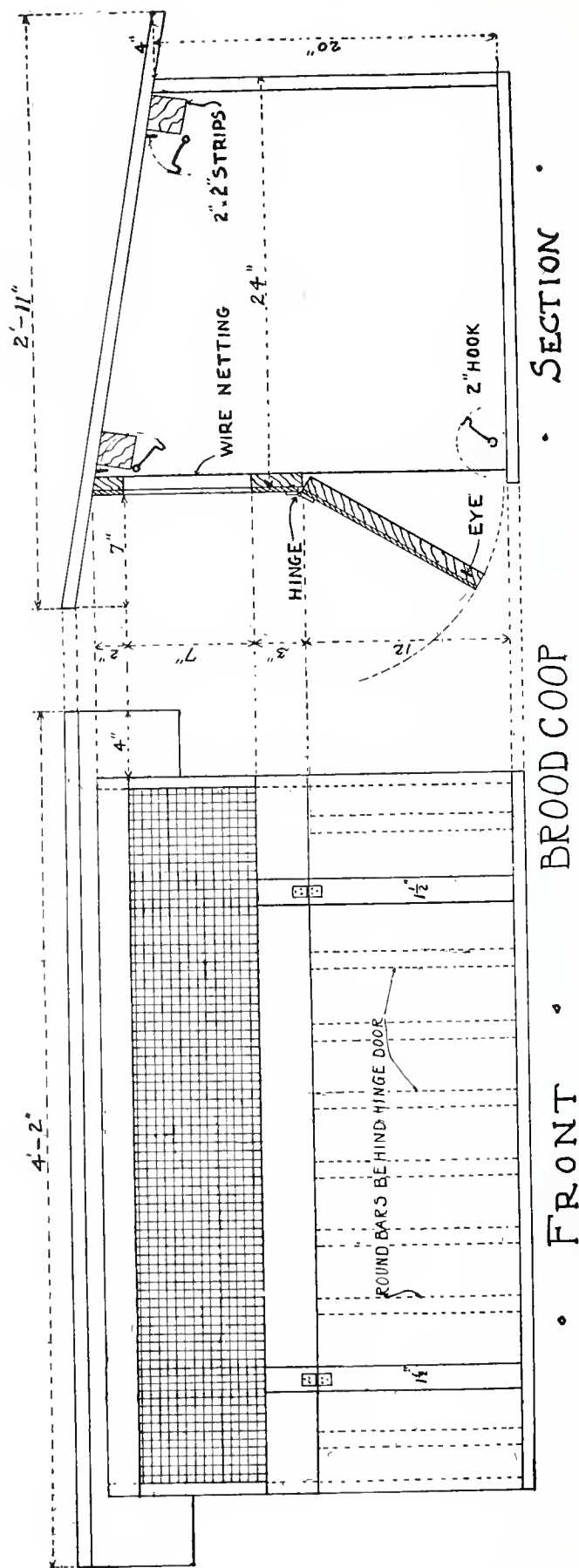


Fig. 8. A mid-winter picture of a poultry farm in the western part of our State, showing a well chosen and almost ideal location for such a farm—a gently sloping hillside with some shade. Also, outdoor brooders in readiness for the early broods of chicks, and the arrangement of the extensive yards for the breeders in the distance. (Courtesy of Mr. Lawrence Jackson.)









# • FRONT • BROOD COOP • SECTION •

Plan 3. Home-made brood coop or small colony house. It is worth while to have a good equipment in the way of brood and colony coops to take proper care of such a valuable crop as growing chickens.

The three sides must be solid and the fourth or front as wide open as possible.

Any box that will give a floor surface not less than two feet by three feet can readily be converted into this style coop. (Plan 3). The back wall need not be over two feet and the front two feet six inches, and it will be worth while to make the roof removable. A brood coop with a removable roof facilitates thorough cleaning, white-washing and sunning. In hot weather it can be raised several inches front and rear thus absolutely guaranteeing the maximum amount of ventilation and coolness. A small box or just a box make poor brood coops. *It is worth while to have a good equipment in the way of brood and colony coops, if it is worth while at all to raise chicks.* The hardest task in the poultry business is this matter of yearly raising the chicks to keep up the supply of first year layers, and anything in the way of equipment that it will lower the immense annual loss at this end of the business and that will raise better and larger "egg machines," is money well invested.

A lot of brood coops all one style, neatly white-washed or painted on a place, at once add to its attractiveness and to its business-like look, and with good coops it is pretty nearly certain that as soon as the season is over they will be moved and stored. Many an otherwise nice farm and group of farm buildings is given a slovenly appearance by the dilapidated and weather beaten brood coops in sight the year round, a harbor and a breeding place besides for disease germs, lice, rats, mice and other vermin.

Along with the non-de-script brood coop must go the practice of having them on the same old spot year after year. The one thing in chick rearing that yet needs to be learned by thousands of poultry growers is *the fear of soil contamination*. There is a lesson we have learned over and over and over again:—that poultry young and old do best on new ground. And there is no excuse to have the brood coops at the old spot or to have them at one spot throughout the entire season, although the latter, if the coop was originally favorably placed may not work much harm. Cultivated ground near sod, and as the season advances, near shade, is the best site for a brood coop. The next coop ought not to be nearer than twenty feet, and twice this distance is better. The further the coops are apart the larger the foraging ground for each brood. But these things must be regulated by the range afforded when the mother hens are out, by the character of the soil, by the size of the broods, etc. Each and every brood coop should be set up off the ground with a brick or flat stone under each corner. Never set a brood coop with a board floor next to the ground. If this is done the floor will soon be damp, often wet and it will afford a splendid harbor for rats.

Early in the season, particularly if the soil is heavy and wet, if coarse sand or fine gravel are easy of access, it will be many times worth while the trouble to spread a bushel or two of this material directly in front of each coop. This will guarantee a clean, dry, sanitary oasis in front of the coops, instead of the usual wet, filthy, and unsanitary spots there found.

The confining of the chicks to the brood coop is an important matter to consider. Even if the coop is large and roomy, as it always should be, there is little or no occasion to ever confine them in daylight hours, no matter what the condition of the weather. While it

is not advisable to let out the hen on rainy days, the writer is firmly convinced that it is less harmful to allow chicks to run out in the rain, *if they want to*, then to pen them and have them worry and cry, chick fashion, all day long. Chicks so penned during a rainy spell, not only stop growth *but actually lose in weight*. Again, the soft, warm spring rains make chicks grow like everything else. While, after the first ten days, the every-day cover of the brood coop floor should be a heavy sprinkling of sand or fresh soil, when a rainy spell happens along several inches of cut clover or non-musty hay or straw chaff should be put in the coops and the grain fed therein. This will turn disconsolate rainy days for mother hen and chicks into picnic days. Chicks that are normally well fed and thrifty thus handled in rainy weather, can be trusted out-doors and will grow uninterruptedly.

Practically everywhere within the State brood coops must be closed up at night on account of vermin. This closing up, save very early in the season, should always be by preference with a wire screen as against a board. Chicks, to grow well, must have an abundance of outdoor air at night as well as in day time.

*Millions of chick growing hours are lost yearly by not leaving the chicks out of the coops at break of day.*

This loss cannot readily be measured in dollars and cents, but it must be enormous. This time is even worse than lost as the chicks spend it in worrying their little bodies in an effort to get out and at the proverbial early worm that so appeals to them. If for any reason chicks cannot conveniently be let out at daybreak, the worrying for release can be partly forestalled by always keeping clean litter on the floor and scattering some chick grain therein after dark the night before, not forgetting to hang up a fountain of fresh, clean water at the same time.

A great mistake is to continue a brood of chickens in a coop they have outgrown. If the coop is large enough at the start this cannot happen; on the other hand this seems to many an undue waste of space when chicks are small. The best way would seem to be to have what are known as colony houses and about the time the mother hen deserts her chicks to move some half dozen or more broods into one such. These colony houses may be miniature poultry houses, say six by eight feet. The most important consideration in the architecture of these houses is the matter of the maximum amount of ventilation.

*Growing chicks, no matter what age, must not pant at night. Panting at night devitalizes the chicks at a fearful rate, causing them to make a poor growth and often lays the seeds of future disease and trouble.*

The colony houses must be far enough apart so there will be no temptation for the chicks all flocking or crowding into one or more. The distance apart depends somewhat on the breed and on the lay of the land, on other buildings, fences, etc., but should be a safe distance at the start, for nothing will so try the temper as weaning a lot of chicks into one house when they have acquired the run of another. It will be found that with the mother hen the chicks will be inclined to go where the hen is, but after weaning, the way to move chicks is to do it at night, without unduly frightening them and keeping them shut in for several days, meanwhile, if possible removing their old quarters. They should be left out the first time just a little before dark so they may not wander far away from their new home. It may



not hurt to repeat this the second night. It will pay to go slow and easy when we try to move chicks, and it will never do to chase and scare them, for our future layers should never know what it is to be man shy.

This obstinacy or perversity of chicks in tenaciously clinging to accustomed quarters is one of the chief objections, if not the chief objection, against chicks roosting in trees. Trees furnish, according to the chick's instinct, the three essentials it wants; abundance of fresh air, no crowding or a chance to choose a comfortable perch, and safety. The older they get, or the longer they sleep on trees, the harder it will be to wean them to houses and as laying age and the cold Fall rains and early snow flurries arrive together, it is highly important that they be under shelter, as these things are not conducive to heavy laying in pullets. To repeat, we cannot afford to "fight" our chicks at any stage in their growth. But rather should we lead them in the paths they are to go by always having them sleep with a roof over their heads.

Even the small colony houses, with large, heavy chicks in them should have the exits closed at night and opened early in the morning, as outlined for small chicks. For if this is not done some vermin may enter and if not destroying any chicks, is likely to so scare them that they will desert this particular house and go to another or take to the roof or to the trees. With a board floor and raised free from the ground we can readily have a vermin proof house.

These small colony houses can be utilized, and usually are, to winter adult stock, either some small select matings or breeding stock, or to hold surplus males, or to finish or fatten such, or as houses to break up or set broody hens, or for various other purposes. They make splendid shelters for small brood coops for midwinter chicks or when fitted with artificial brooders or movable hovers, 50 to 100 chicks can be started in such a house and as soon as old enough to do without heat, the hovers or brooders can be removed and the chicks left undisturbed. This is the ideal way and one much in use where large numbers of chicks are raised. In case of fire, and fires still continue with annoying frequency, these isolated brooder houses have a great advantage in minimizing the risk as against a long brooder house. With a fire in the former, the loss will be confined to a fraction of the equipment and the season's chicks, in the latter the loss is likely to be a total one.

## FEED AND FEEDING

### FEEDING, THE CRUX OF BIG EGG YIELDS:

Any child can feed chickens. It seem thse simplest of all the poultry operations. Given the chance, at least at certain seasons, chickens may almost feed themselves. But the careful poultry keeper views feeding differently, knowing full well that good feeding and environment have been close seconds to breeding and selection in the development of our present day heavy laying breeds of fowls.

The general public has always been prone to attach too much importance to feeding in the sense that it is holding to the opinion that the one requisite to successful poultry keeping is to know what to feed and how to feed ignoring all else. This cannot be reaffirmed too

often. However, to humor this feeling much will be made in this chapter of feeding, for feeding IS of great importance. Without food life cannot exist, and good feeding occupies the same relation to heavy egg yields that skilful firing of a locomotive does to high speed. An inexperienced fireman or one with poor fuel can get out of the most powerful locomotive only most indifferent results, and an inexperienced poultry feeder or poor feed can result only in a low egg yield.

And, feeding is *the* vexatious difficulty in getting big egg yields. Just as the experienced and skilful fireman coaxes out of his thundering locomotive the last pound of power and high speed by careful stoking (feeding) so must the poultryman handle his hens that he may get up to the last notch possible in egg production. This skilful handling of the feeding is not easy. Surely there are a great many more men that learn how to fire locomotives in the maximum degree than there are poultrymen that learn so to fire (feed) hens that they will do their best at winter laying.

*Unfortunately, we do not yet have anything like the accurate data that would warrant us in believing that we can make of our poultry feeding an exact science.*

To some it may seem that there has been much done and much published along the lines of scientific poultry feeding. But, without wishing in the least to discount what has been done, it can still in fairness be stated that the field of careful and exact research work along this line has only been scratched over.

Naturally, therefore, there are as yet current many opinions as to the best methods of feeding hens for eggs and as long as we are partly dependent on opinions it is as well, if to lessen the confusion, we absolutely refuse to pay any attention to those emanating from poultry people or others who have not made good or who cannot show results of many years standing. Or, whose stock does not look as if it was bringing results. As things are, we usually have to go by looks, although hens may under certain feeding be in high health and look as if they were laying heavily and yet be performing moderately. We even have to watch the man who gives us columns "of scientific poultry feeding and balanced rations." I am very sure that some of the most ill-kept appearing poultry I have ever seen was in the hands of these would-be but spurious scientists.

The difficulty of feeding for big egg yields can be further encompassed by persistently bearing in mind that results depend as much on how we feed as what we feed. One of the various by-roads of this principle is the

#### VALUE OF VARIETY IN THE RATION:

One of the difficulties of determining what is scientific or correct poultry feeding is the strongly inherent love of the hen for a variety of food. She won't do her best if tied down to a few articles of diet, and will only allow herself to be coaxed up to a winter egg yield and a maximum yearly egg yield by catering to her love for variety. She particularly quickly "stalls" on various foods if they are fed in such manner that she can have free access to them at any time without effort.

*Wheat and corn and oats, etc., are forever new to a hen when she can dig them out of deep litter.* Here is one of the reasons why hens can be got to eat more when the bulk of what they get is fed in deep

litter only. Variety may be overdone. First and last a heavy layer is after all a heavy worker, and as such she wants a large bulk of plain substantial food. For instance, the writer considers no scratch food complete unless there is a small per cent. of all or some of these grains and seeds mixed therein: millet, kaffir corn, broken rice, sunflower seed. And yet to buy heavily of these and feed them the same way, turns out to be sheer waste. The wheat, cracked corn, oats and buckwheat of the granaries of the farmers of our State are the substantial poultry grains, but if hens will scratch longer and deeper and eat more of these home grown grains, and lay more eggs if there is a small admixture of imported grains, then it will pay to buy these.

It would seem mixing all the grains together is the better way as against feeding all one grain one meal, and all one other grain the next and so on. If hens crave variety then this latter is certainly not the way to feed. Again, it can be laid down as a principle, that first of all a hen should never have a meal and that her crop should never be full of one sort of feed. Also individual hens have individual idiosyncrasies as to tastes. For instance, some one hen may have little taste for cracked corn. What of this hen when the feed is all cracked corn? She will have to eat what she don't like (a waste) or wait over to the next feed. Quite by accident we discovered here a hen that literally craved rye. And a hen that did well on it. Now rye is a grain rarely eaten by hens. The tidbits known as table scraps are the most attractive of all the feed variety we can offer our poultry. And lucky is the flock where these are fed with discretion and in quantity.

Where they are not to be had, small quantities of boiled fresh meat are a good substitute, for after all it is mostly the meat and the meat-flavored scraps that the hens so enjoy in table scraps. There are a great many table scraps that should never be fed to laying hens. The least desirable are mouldy and sour ones. Mould is liable to do great injury to poultry and soured food always disturbs the digestive functions, resulting in loose bowels. We believe that it would be cheaper to pay out a five-dollar bill to have a mouldy pie or a soured pot of mush or beans hauled off the place than to feed it to our hens in high lay. These things can put enough hens off their feed and stop the egg yield (it may take some hens weeks to return to full lay) enough to cost us many times the five dollars. It is not an easy thing to coax hens up to a high pitch at laying in midwinter and anything that has as strong a tendency to get our egg machines out of gear as these spoiled foods must be strictly guarded against. Other table scraps that are dangerous are salty meats. Any but very small amounts of fat are harmful.

One thing in particular about feeding table scraps that we cannot understand is, why people should, week after week, throw garbage to chickens that they won't eat. These things only soil the yard and taint other food they may come in contact with it. Again, it is worth while not only to carefully sort all table scraps but to put them in such shape that they can be readily eaten. A lump of fat if carefully cut up and divided so that when fed it goes to a dozen hens, fulfills some useful mission. Gulpd down by one hen it is likely to do harm. Many cases of indigestion (misnamed by many "cholera") are originated by large lumps of table scraps. An undivided piece of meat or bread dragged through filth and dirt and covered with the slime of half a dozen mouths in successive endeavor to swallow by as many hens are "table scraps" that had better never been fed.



## A COMPLICATED RATION AND A SIMPLE RATION:

There is a difference between a variety ration and a complicated one. The latter rarely brings results unless in most experienced hands anyhow, and is very burdensome on the keeper. To feed hens a six o'clock breakfast of oats, a nine o'clock lunch of wheat and cracked corn, a dinner of boiled mash and scraps, a three o'clock lunch of succulents and perhaps some more grain, and a five o'clock supper of whole corn is to be a slave to chickens. To mix up a mash with some half dozen or more ingredients, to feed as many or more kinds of grains, to vary the menu day by day, so that hens get perhaps several dozen kinds of feed is an unnecessary, not to say foolish, waste of time. The other extreme, whole corn and nothing else, is a waste as to results. In the hands of an amateur the latter may be the safest, as one of the troubles of the complicated or fancy ration is that it frequently gets the hens off their feed, and under this condition results are as small as under the simplest ration that is much cheaper.

There is a happy medium and each one must figure out for himself how far he can go or how far he dare go with complicated rations. To get maximum results with the minimum of labor is just as desirable in poultry keeping as in any other business or occupation. A simple ration or method of feeding fits simple and farm poultry keeping. If hens are confined to a house and small yard they must be supplied with many things they would find for themselves on a farm range. And the closer and the longer they are confined the more need have they of complicated feeding. Part of this will be the result of the endeavor to bring about natural feeding or feeding combined with occupation,—exercise.

*Just so far as a hen knows what she wants she wants occupation. She don't care a rap for exercise as such.*

In close confinement we try to make it up to the hens both in variety of food and in occupation, and what a sorry mess we often make of it. Necessary as this "making up" to them is when closely confined, after all we cannot match the free range or its equivalent. All of this does not hold good in midwinter in this State, when all our poultry is often shut in by stress of weather; *nor do laying hens seem to greatly miss freedom in cold weather.*

## THE FIRST FEED:

The first feed for little chicks should be slow in coming. Never before they are thirty-six hours old and if they are in a brood coop with tender growing grass and clean drinking water, within reach, they are all the better if they are fed nothing until they are seventy-two hours old. Realizing the fact that starting chicks right was practically equivalent to raising them, and to raising the very best kind of adult chickens, we were constantly experimenting with and closely studying this matter of first feeding. As a boy on the farm and then already greatly interested in chickens, we had a never-to-be-forgotten experience when one day we discovered in the loft of the hog-pen that could not be left by them a brood of chicks from a stolen nest, that appeared to be at least a week old. The thing that left the impression was that there was no possibility of these chicks having had any food save as they could catch flies. These little chicks were as wild and as spry as so many young quail. How these little chicks did afterwards we do not now remember. We made one experiment,



with the brood coop located as in a previous paragraph, withholding all food for seven days. There was no cruelty in this, that the chicks gave any sign of and we do know that this lot lived and did as well afterwards as if nothing exceptional had occurred. However, the objection to withholding food after they are thirty-six hours old is that they are apt to be hungry, and if food is withheld for several days longer, quite hungry. The temptation then to see them eat, to over-feed, the first meal or meals is very great. Overfeeding at this time means that food will ferment in the crops, that the chicks will develop loose bowels—and trouble has begun.

Due entirely to the fact that baby chicks can do without food for several days, has the enormous trade in day-old chicks, which has sprung up within the last few years, owed its existence. Chicks are now shipped to distances of four and even five days en-route. The caution not to over-feed the first few meals or days even, after arrival applies very strongly to these shipped, day-old chicks.

*Experience has convinced me that there is a direct relation between the way the parent stock has been fed and the way the chicks therefrom can be fed.* If the parent stock is satiated with food, the appetites and the digestion of the chicks will be *blase*—used up. If on the other hand the parent stock was chronically hungry, the chicks will be born hungry—and we can almost forget this question of what and when to first feed. We do not mean chicks from starving hens, when we speak of chicks from hungry hens. By “hungry hens” we mean hens that are perfectly normal. Man, by reason of the environment he forces on hens, rarely allows them to be perfectly normal and hence he pays the penalty when he goes at rearing chicks. The direct lesson this teaches is to avoid over-fat hens as breeders and on the other hand to give these same breeders the largest amount of range possible with that supplied feed that makes for muscle and vigorous health. Our best “tonic” for baby chicks is to feed vigorous appetites and good digestion into the parent stock.

The reason why newly hatched chicks do not require feeding is that just previous to emergence from the shell they enclose what is equivalent to almost the entire yolk. This yolk remainder is for the distinct purpose of supplying food to the chicks. It is a sort of enclosed reservoir of food. And when this reservoir (yolk) refuses to be properly absorbed our chick dies or makes a slow, stunted growth.

#### FEEDING LITTLE CHICKS:

The critical period in feeding little chicks is up to the end of the second week. In Leghorns and similar breeds this may well be extended up to the end of the fourth and fifth week, for the critical period should include not only keeping the chick alive, but keeping it making a quick, uninterrupted growth.

The first feed should be:

Stale whole-wheat bread.

Sweet milk.

The bread should be broken into crumbs or run through a mill and these crumbs moistened with sweet milk, not wet or sloppy, but in a crumbly condition. It is not necessary to teach chicks to eat. If they show no disposition to eat remove every bit of the food and destroy, or feed to other chickens, and wait another twelve or twenty-four hours. This bread and milk should be prepared fresh for every

meal and should be dropped before them if brooder chicks, in small driblets so that the moving food may catch their eye; you do for them then what the mother hen would do. Two or three small feeds the first day are enough. The second day a small feed or two of rolled oats may be added and fed alternately with the bread and milk. By the third or fourth day they must have a little green food. In winter a box of rye growing in a sunny window will supply this, or apples, cut in two make a fair substitute.

*There is no one food for baby chicks equal to the stale whole wheat bread crumbs and sweet milk, fed crumbly.* Either alone is a complete food and fed in combination makes an easily digested and assimilated feed, and one that is keenly relished by the chicks. Ordinarily, white wheat bread is only a fair substitute, and when used a dish of dry bran should be kept within access of the chicks. Sour milk may be used instead of sweet, but even when it can be had of always the same degree of sourness, which is important, it will not equal sweet milk.

The one substitute for sweet milk is fresh raw eggs beaten up light and mixed with the stale bread. This feed will put little chicks, so low in vitality that they are about ready to quit, on their feet again, and with it strong little chicks will fairly jump in growth. ,

Some may object that all these feeds are expensive, too expensive to feed chickens. We hold this is not a fact. It takes only a very little and if by feeding these expensive (?) foods, you have something that will make your chicks *live and grow* you are saving money in the end. If a day-old chick is worth ten cents, if it dies ten cents are lost. If a hundred die ten dollars are lost. Ten dollars will buy a lot of bread and milk. Besides there is endless satisfaction in seeing chicks live and do well as against losing them.

Feeding rolled oats or oatflakes exclusively has nothing to recommend it. They are large, easily seen and readily picked up, and oats are a splendid feed to make growth on. But feed along to baby chicks they are too pasty or starchy and induce indigestion and bowel trouble.

A little chick is a meat eater. It began life as a meat eater (the yolk) and in this it is not dissimilar from most other animal babies that begin life as pure meat eaters—milk drinkers. And after they begin active foraging and scratching, which should not be later than the fourth day of feeding, they may have small quantities of finely chopped or shredded lean meat, slightly parboiled. The hearts of sheep and oxen supply a cheap source of this kind of meat. Only a very little must be fed at one time. The ideal way to feed it is to dry the bits in meal and bury it in the cut clover litter or scatter it widely in front of brooder or brood coop. So that they get it in bits and make no meal of it.

Bugs, worms, meat should occupy a prominent position in our feeding of little chicks and in combination with grass and tender sprouted things, should form the largest bulk of the dietary of our small chicks. Chicks grow on what they eat and they must be supplied with a wealth of the same matter their bodies are made up of. In Leghorn chicks with lack of meat the early feather growth robs the body resulting in dragging wing feathers.

## COMMERCIAL CHICK FEEDS:

These are a mixture of various cracked and whole grains and seeds bagged in one hundred pound lots and put on the market commercially by large milling concerns, grain dealers, etc. A few years back this sort of chick feed was commercially unknown, and although the writer has no accurate means of knowing, yet, at a guess he would say that hundreds of tons of these commercially prepared chick feeds are now sold annually in this State alone. And for very many people, perhaps for most people, they are the best feed for small chicks. There is not near enough of the old fashioned wheat-screenings to cut even a figure in feeding the little chickens of this day. As an improvement on cracked corn and cracked corn alone these mixed or "balanced" commercial chick feeds are enough ahead to alone warrant their great popularity.

The greatest merit of commercial chick feeds, however, is that they furnish the easiest and safest one feed on which to raise small chicks. Perhaps, it might even be added to start them with. With a good, free range they ordinarily supply everything the chick needs to make a splendid growth. They are a safe feed too in that the danger of over-eating of them while chicks are under ten days, is small. They are safe in the sense that they are dry and do not sour or taint, and do not sour or taint feeding vessels, troughs, or boards. Also they do not gather unto themselves dirt or filth for the chick to swallow, and are highly adapted to feeding in litter. They are easy to feed in that they are always ready. The bread and milk advised on a previous page demands the strictest cleanliness on the part of the attendant and a great deal of good judgment in the amount fed. An amount of bread and milk equivalent to a small pea is enough for one chick for one meal and by the end of four or five days a hardy chick will want seven or eight such meals and more in one-half day.

We have heard it repeated time and again, to feed small chicks "little and often." This is first class advice and it is of the highest importance when soft feeds are fed that they be fed often, at regular periods and a very little at a time.

*It is not good feeding to feed very small chicks all they will eat up clean. They will eat up clean more than is good for them.*

This holds especially with soft feeds, and with soft feeds we should include rolled oats. It is important enough to start chicks right, to learn how to feed soft feed only, the first few days. But after that period chick feed should be gradually substituted and by the end of the first ten days be the main feed, or the feed.

The difference between bread and milk and chick feed is that the latter if fed in litter need not be fed oftener than three times a day even to small chicks. Or if the weather is fine it can be scattered broad-cast in front of out-door brooder or brood coop. Thus the little chick gets its food bit by bit and can have both occupation and be at eating all day long. That's exactly what the chick wants. There is no danger of over-eating when thus fed. With some the danger may be the other way, that the chicks do not get enough. The keeper must use his judgment and if thorough any circumstances it happens that chicks fail to be ready at any one feeding for more food, same should be entirely withheld. It is worse than foolish to throw food before little chicks that show they are not hungry. Skip that feed. Never have food left over or laying round either.



Commercial chick feeds vary greatly in composition. Some are offered at a price too low to supply good feed. Others are sold too high for what they contain. Some pretend to be a balanced ration and other come fairly close to being this. Some are heavily "loaded" with cracked corn—a feed that can usually be had readily at a much lower price. Others are weighted with grit and oyster shell and while it is unreasonable to pay two to three cents a pound for this material, if it is not going to be supplied outside the chick feed, then it is worth all it costs as chick feed. Some brands (notably one or two western) contain a large amount of weed seeds. If it were not that among these are a few of the more noxious that chicks do not eat, small objection could otherwise be found. Many weed seeds are rich in protein and anyhow little chicks not only like them but crave them.

The one sort that should be absolutely refused is that in which the cracked corn has become heated or musty. This is usually the case if a stock of this goods has been carried over from the season before and like as not stored in some damp warehouse. It won't hurt to examine every lot of chick feed bought, under a pocket microscope or good reading glass. Such examination will promptly show up what's in the mixture and the condition it is on. Even other grains outside of cracked corn are all the better if fed when freshly cracked and this, outside of quality and cost, may be a reason for mixing chick feed at home. The following formula we used for many years and the materials for which can usually be found wherever there is a mill and a grocery store:

- 25 lbs. Cracked wheat or wheat screenings,
- 20 lbs. Pinhead oats (granulated oatmeal),
- 5 lbs. Rolled oats (oat-flakes),
- 25 lbs. Fine screened cracked corn,
- 10 lbs. Cheap broken rice,
- 10 lbs. Pearl millet,
- 5 lbs. Fine grit, shell and charcoal.

Frequently, grocery stores have package goods of oat-flakes, split peas, hominy, etc., that have "jumpers" in them that they are willing to sell at a very low price. If otherwise sweet, these make splendid materials to use in compounding chick feeds. Also occasionally broken and "wrecked" rice can be bought very cheaply. Package bird seed is also to be had occasionally at bargain prices and will take the place of millet seed.

A simpler one was made up of as follows:

- 50 lbs. Good wheat screenings,
- 40 lbs. Fine cracked corn,
- 10 lbs. Rolled oats.

Frequently commercial chick feeds contain too much fibre or waste indigestible material. Two per cent. fibre on the bag reads high enough and four per cent. should cause us to look for something selling for more money. Chick feeds high in fibre and wastes, together with such as contain too large a per cent. of cracked corn, should be re-inforced by the addition of pinhead oats, cracked wheat, broken rice and millet.

*Chick feeds as usually made up are for small chicks only.* A normal chick at four weeks old has in a large measure out-grown chick feed. At this age if not already started on something coarser, a mixture something like this should be fed:



300 lbs. Chick feed,  
 50 lbs. Whole wheat,  
 50 lbs. Hulled oats,  
 50 lbs. Coarse cracked corn or Kaffir corn.

In a week or two the per cent. of chick feed can be reversed and soon entirely omitted. The important thing is to change feeds gradually and that the periods of change lap over a week or two. Don't try to make the change by giving occasional feeds as of, say all whole wheat. But rather mix the wheat in as indicated in the formula. The writer spoiled and lost a good many chicks until he learned this lesson.

Unless the range is exceptional in its supply of insect life, along with all grain chick feeds should be daily fed some meat. A good grade of beef scraps should be kept where they can have access to them at all times or be fed as part of the dry mash. The words "a good grade" should be strongly emphasized. When chicks have reached two months beef scraps may be re-inforced by small feeds of fresh cut green bone. Do not feed green cut bone to small chicks and be regular "cranky" that the bones and mill be always absolutely sweet and clean. Tainted raw meat or bone are often violent poisons to chickens in hot weather and ptomaine poisoning from same may cause an epidemic of violent diarrhea.

#### A GROWING RATION:

Some manufacturers, realizing that there was a demand for something in between chick food and scratch food, have put on the market a growing feed. This can be had as a grain mixture and as a dry mash mixture. Either can be mixed at home; sometime at less cost and sometimes not. However, when mixed at home one can be more sure of the quality of the ingredients. A good formula is:

200 lbs. Red wheat,  
 200 lbs. Coarse cracked corn,  
 200 lbs. Hulled oats,  
 50 lbs. Coarse beef scraps.

Now, red wheat is always superior as chicken feed to the soft white wheat and old wheat only should be fed. The hulled oats we consider very valuable in fact nothing will grow such large big framed chickens as these hulled oats. They can often not be had unless especially ordered but it is worth while insisting on having them. As growing chickens acquire likes and dislikes for food more readily than after they reach adult age, it may be well to compound a ration for chicks three to four months old and upwards by adding some barley or whole oats and buckwheat. If kaffir corn is low in price part of the cracked corn may be cut out in favor of this grain. Or we mix as our formula:

200 lbs. Old wheat,  
 100 lbs. Cracked corn,  
 100 lbs. Kaffir corn,  
 100 lbs. Hulled oats,  
 50 lbs. Whole oats,  
 50 lbs. Buckwheat,  
 50 lbs. Coarse beef scraps.

Feeding additional beef scraps if they show a disposition for it or feeding beef scraps separately in hoppers.

Those who feed dry mash use a formula something as follows:

300 lbs. Corn meal,  
200 lbs. Middlings,  
100 lbs. Gluten meal,  
200 lbs. Bran,  
100 lbs. Alfalfa meal,  
100 lbs. Beef scraps.

Feeding whole wheat or equal parts of whole wheat and cracked corn as the grain ration.

With free range it is unnecessary to work large chicks by making them do much scratching in litter. It will not hurt to have litter, in fact we like chicks to come to the houses feeling that they can enjoy a hunt for grain and coarse beef scraps any time during the day appetite dictates; and we give them a strong inducement to stay at this on rainy days by feeding all the grain for the day in the litter.

The feeding routine that we like best for free range chicks is to daily at five P. M. feed a liberal amount of the grain ration in troughs and allow the chicks to take till dark to fill up. There should be enough left for breakfast but if left out early enough they will not eat much. Then what is left is scattered in the litter and if none is left other feed is brought for this purpose. About eleven o'clock we feed as much wet mash as will be eaten up very quickly or about one-third less by occasional tests, than they would eat if given the chance. A lot of large husky chicks will make love to a surprising amount of a wet mash they like. The formula for this is:

300 lbs. Finely ground oats,  
300 lbs. Middlings,  
300 lbs. Bran,  
100 lbs. Fine or screened beef scrap.

Mixed with boiling water and allowed to cool. This mixing of this mash is made part of the routine of the morning work.

No method of feeding growing chicks in our experience will grow larger or better ones. In November one year we sold one party 40 March hatched pullets and 4 cockerels Silver Plymouth Rocks with the pullets weighing uniformly at or near the eight-pound mark, and the cockerels at or near the twelve-pound mark.

Feeding wet mash heavily will grow chicks faster and perhaps a little bigger, but it was found that chicks raised on plenty of wet mash as laying hens would not eat as much mash as was desirable under forced feeding for the maximum number of winter eggs. Also that the growth was not as uniform, nor the subsequent laying under ordinary treatment as satisfactory.

Chicks raised on range and fed no mash at all, while not as large and having a larger percentage of culls, would, in selected specimens, have the hardest, glossiest plumage (especially noticeable in Brown Leghorns which we bred for many years) and respond best of all to forced feeding for winter eggs or in the males to fitting or fattening for the table by means of all mash feed.

For the village and town poultry keeper who wishes to mature a lot of chicks, on a small area to make laying stock off, we have little advice to offer. The thing can be done, is being done—in boxes so small too that it might be designated the bird cage system. Occasionally they look all right too, but such chickens never will stand up to or stand up under heavy laying for more than one generation, if at

all. The villages and towns are no place for growing chicks in the dog days, and neighbors are warranted in complaining of them as nuisances, resulting occasionally in ordinances prohibiting poultry keeping entirely.

The logical substitute for range is scratching in litter and in diligent looking to the supplying of substitutes for the tender green things and insect life picked up on the range, with a constant watch that the chicks are never over-fed and yet constantly well fed.

Before leaving the subject of growing chicks, there are two things so closely related thereto, that they are well mentioned here. The first is the necessity of a constant supply of clean, fresh water. Chicks should never go dry lest they over drink. The vessels should be clean and sanitary; scrubbed occasionally with boiling water and thoroughly sunned. Stone, glass or crockery dishes or two-piece fountains are best. Cheap tin and wooden vessels are not good. The second is that while we are feeding we simply cannot afford to feed lice. *Constant* vigilance and the use of well-known remedies will keep these in check.

#### A LAYING RATION:

The laying ration is very little different from the growing ration for large chicks. This was figured out from the view standpoint that, as a complete egg was a new chicken, the same feed that would abundantly supply material for growing chicks would in the same measure supply it for eggs, and there being plenty of it there would be plenty of eggs. The winter season is, of course, different from the summer and growing season and some things will have to be added and be done differently. We also make a decided distinction after pullets have reached maturity in the amount of corn we feed. To Leghorn pullets in their first winter we would feed more corn than we would to Wyandotte or Plymouth Rock pullets with their abundant fluff and breed pre-disposition to put food on their backs in the form of fat. To two-year-old Plymouth Rock hens kept for laying we would feed no corn at all, for at least among our larger strains or families of this breed there is a strong disposition to lay up fat, and to aid this with corn is not common sense.

*There never can be a balanced ration that will hold for all sorts and conditions of laying hens.* What would be a balanced ration for neighbor Jones' flock would not be a balanced ration for neighbor Smith's flock, with chickens of a different age, development, breed, manner of housing, etc., etc. There is no intention in this bulletin to print a table of food values of the different grains and food stuffs, or enter into an extended discussion of the composition of foods, and how to balance up a ration scientifically. These things though are of value, and the advanced student of correct and profitable poultry feeding will not be content until he has mastered all the data we have along these lines.

Of the different grains corn is the most fed, but it is a fat and heat producing food and should be always so viewed. The great problem in open front houses is to keep Leghorns in them from "pouting" in very cold weather, and there is no one grain that we have that will so cheaply and effectually keep a Leghorn pullet warm and happy as corn. Corn is the grain most greedily eaten by chickens and because of its size they can quickly fill up. This and its make up has a strong tendency to make hens fed heavily on it over fat. From a close study



it must be that hens so seem to relish corn merely on account of its size. When cracked it seems to have no special attraction over other grains, and allows them to eat it the same way, two reasons why corn should always be fed only as cracked corn. Wheat is the one best chicken grain, and yet if one grain and one only is to be fed corn turns out to be better than wheat. A good heavy oats ranks next to wheat. Light oats and barley are a delusion and have so much fibre that a hen will waste a lot of food value getting rid of it, or she can eat enough only to keep herself going and perhaps do a little at laying besides.

Too many of the scratch feeds contain much of this stuff, besides shrunken wheat, poor buckwheat and a lot of corn hulls, etc. Some kaffir corn and sunflower seed are added; the whole put up to sell at a low price to meet competition. It has sometimes seemed to me that the poorer the stuff the larger the per cent. of sunflower seeds—the latter for purposes of a good “front.” If low priced scratch feeds are to be used they will bear re-inforcing with equal quantities of good, sound wheat and cracked corn. A hen to do heavy laying must have a large amount of the cleanest, soundest grains and feeds and the hardest red wheat and the plumpest oats and the cleanest, soundest cracked corn are very much the cheapest to buy. Buckwheat is grown in some of our counties and although not very highly thought of as a laying food by many poultry authorities, the writer in repeated tests has always found it very satisfactory and is using it right along. Barley is more difficult to get and often too high priced here. Kaffir corn occasionally is used largely and pearl millet is always part of the scratch food or laying grain ration. The formulas that follow may be varied somewhat in different years depending on the prices of the various grains and the ease with which they can be had. They may vary considerably and yet by a little skillful planning be practically the same in effect.

Formula for home-mixed scratch food for Leghorns for cold weather:

400 lbs. Cracked corn,  
300 lbs. Wheat,  
100 lbs. Hulled oats,  
100 lbs. Buckwheat,  
50 lbs. Whole oats,  
50 lbs. Pearl millet.

Leghorns being dainty feeders never take readily to whole oats, no matter how heavy they are and hence we feed the minimum amount. But with warm weather we reverse the position of the corn and wheat and substitute if possible some part kaffir corn.

A formula for large pullets of the Plymouth Rock and Wyandotte class for cold weather:

200 lbs. Cracked corn,  
400 lbs. Wheat,  
100 lbs. Hulled oats,  
200 lbs. Whole oats,  
50 lbs. Buckwheat,  
50 lbs. Pearl millet.

Pullets of the above breeds are grosser feeders and along side Leghorns it will be noticed they will eat many things the former will



scarcely nibble at. If hulled oats are hard to get, whole oats or barley may be substituted.

Besides what we feed it is of

#### GREAT IMPORTANCE OF HOW AND WHEN WE FEED:

There is no hard and fast rule of how much to feed. To pretend to be able to tell a man how many quarts of feed his distant flock of hens should have per day is mere buncombe. There is no gauge save the hens themselves. In a cold snap they will want more; in a warm snap less. If they are laying more eggs this week than last they want more—must have it if they are to lay still more the week following. To keep your hens always hungry and yet always well fed is where the science of good feeding enters in. Hens want to be gradually coaxed into eating to the full capacity of their digestive ability. They ought to be found at night on the roost with full crops and leave the roost in the morning keen for food. Hens so fed, on the right sort of food, are bound to lay heavily.

A comparatively easy way to get hens to eat a large amount of food day after day and keep up a lively appetite is to endeavor to feed them the way a hen will feed herself as soon as Spring opens on the range, getting her food bit by bit, intermingled with pleasant exercise and occupation. We can copy this by feeding every bit of grain fed in deep, clean litter. Clean, long, rye straw makes the best litter. This should be eight to nine inches deep at the start and kept so by the weekly addition of some fresh straw. Under busy feet even rye straw breaks up very quickly and when the finely broken straw gets six to eight inches deep, no more should be added and after a little while, depending on the season, how crowded the house is, etc., this broken straw should be removed and a fresh start made. When litter is broken or fine the grain has to be forked in. Judgment must be used in the depth the litter is kept at. For green Leghorn pullets six inches to start with may be deep enough. Twelve inches may not be too deep for strong two-year-old Rock hens. To have a little straw or chaff on the floor is not deep litter. Next to rye straw chopped corn stalks make a good litter. The hens will eat a lot of these. So they will of clover hay but this quickly becomes damp when used as litter.

Planer shavings, especially when of white pine, make a fairly good scratching litter. Leaves are much liked by the hens, probably because they have some insect life mixed in and attached to them and when bright and clean are desirable, only that they have to be replaced very frequently. All dusty, musty or mouldy litter should be avoided. In fine litter, the grain must always be forked in, *doing same toward the light*, as hens always work litter the opposite way.

Not only do we religiously feed all the grain part of the ration in this scratching litter, but we feed the coarse screened beef scraps, the shell, the grit and the charcoal the same way. All these can be mixed in the grain formula when same is made up or in the case of the beef scrap one to three quarts fed daily to every one hundred hens, will be found about right. The shell and grit and charcoal can be added on a regular day weekly. Just how much depends on various things. Laying hens will eat up about four times as much shell as grit and charcoal used in proportion, will usually stand as about one to twenty.

The point is that when beef scrap, shell, grit and charcoal are fed

in the litter laying hens will eat a great deal more of them than when they are off to one side in some hopper or dusty box. They will get the beef scrap bit by bit all day long same as they pick up insect life on the range, and while it is important that our winter laying hens never have a meal of grain, a "meal" of grain will do much less damage than a "meal" of meat.

*Nature never intended the hen to have a meal of anything.*

In working over the litter if fed therein grit and shell and charcoal are bound to be before the hens all the time and they will be reminded to eat these things, and will eat them. Besides this feeding everything in the litter does away with the clutter of all hoppers, feed boxes, etc. that take up room that should belong to the hens, and that are vermin and dust receptacles and harbors. Again, when grain and beef scrap are fed in litter and in litter only we at once quit paying toll to sparrows, rats, mice and all grain and meat eating vermin. The English sparrow has not learned to scratch as yet and rats, mice, cats, etc., can gather small toll of grain and beef scraps when same are scattered in and covered with litter.

How much grain to feed in the litter to any one lot of hens can be answered only by the attendant. The amount fed must be gauged by the actions of the hens and by the amount of feed left in the litter. If at feeding time on opening the litter at several places, it is found that the feed is entirely gone more should be fed; if there is a lot left only a little should be fed or none fed at all; if there is a small amount left the amount being fed is about right. Careful note should be made too if there is still plenty of shell and grit. This when feeding grain in litter only once a day. When grain is fed in litter three or more times a day the amount to feed becomes mere guess work; the hens mere loafers awaiting for the favorite grains the next feed may bring and the diversion of being fed. If the litter is deep enough, in the summer, with good range, feeding three times a week will do and if done right the hens will pay no attention to the feeding day or hour; be always well-fed and yet never over-fed. In the winter when Leghorns especially need coaxing to do heavy feeding a good plan is to test them occasionally just before dark with various pans of grain. Their actions to a skillful observer will give some indication as to whether the ration is balanced and whether they are getting enough. Litter may be too deep—work too hard for Leghorns. Much as all poultry loves corn, under this method of testing, hens may utterly ignore a pan of corn. If they empty a dish of wheat along side, the lesson is obvious.

*Litter feeding should find all hens busily at work in the morning; some hens at work at all hours of the day; all again busily at work the hours just before dark.*

The hour for feeding that is best adapted to bring the above ideal conditions about may be anywhere between three o'clock P. M. in mid-winter to 6 o'clock P. M. mid-summer.

#### A WET MASH; SO-CALLED DRY MASHES:

There has been a lot of controversy among poultry people of late years pro and con on the subject of wet mashes and dry mashes. The dry mash fellows are in the majority, as is natural when it is considered that more men can feed dry mash successfully than wet mash.

They are also the most radical in the support of their opinion—as again they naturally would be, after having made a failure or half a success with wet mash, and finding dry mash superior for them, they have adopted it and clung to it. Every one has a right to their opinions, and the only deplorable thing about this present day hue and cry in favor of dry mash is that many are using it who could successfully use the better mash—a wet mash,—but who have never tried it.

*There is no room to question the claim that when properly compounded and fed, wet mash will produce better results in egg production than any other method of feeding ground grains.*

It is also only fair to state the counter claim which is just as true that wet mash not properly handled will do a great deal more harm than good. Wet mashes are liked by hens. They like all the soft things they find on the range, bugs, worms, tender green things, swelled and sprouted weed seeds, etc., in fact, it is a question if a hen left to herself eats anything else. Sprouted oats is only a form of wet mash. Could they talk, hens one and all would vote against dry mash. They are not a chewing animal. They cannot moisten this dry, powdery feed but must “twist” it down somehow, hit or miss and then visit water dish or pail. Hens will get the water whether the mash is fed wet or dry. The only difference is that in the one case the attendant mixes it in an unappetizing (to the hens) mass and makes of it an appetizing mash, and in the other case he simply pours the water in pan or pail.

*Dry mashes nullify the greedy instinct of hens for things liked, inherent in all animals, and the lack of common sense in man in putting the means of unduly gratifying this, daily before hens; as well as his carelessness as to cleanliness.*

The claim that dry mash is the most economical is only tenable under some conditions. It is true that the labor of mixing and feeding as against wet mashes is considerably less. But this is nullified by the waste and toll taken when fed dry and by the fact that a smaller amount fed wet will show the bigger results. With Leghorn hens in winter where our every effort is to feed concentrated food and to get them to eat a lot of such, we work directly against these efforts by forcing dry mash on them.

The formula for a wet mash as given in a previous paragraph contains no cut clover or alfalfa—(favorite ingredients for dry mashes) and only 10 per cent. beef scraps. Now, a certain per cent. of cut clover or alfalfa or meals of either can be and should be added for hens of the Plymouth Rock and Wyandotte types, but for Leghorns a better way is, when possible, to brew these things and use the liquid in place of boiling water. A small per cent. of the dregs can be added occasionally. The coarser, larger Rocks and Dottes can use and will use a much larger per cent. of roughage than the Leghorn, but even for the former it may prove to advantage to swell and soften the clover or alfalfa before incorporating with the ground grain portions.

As to the 10 per cent. of beef scrap, the writer formerly used a much larger per cent. but he has reached the point where he not only believes that 10 per cent. is enough for the mash, but that it is a waste of money to force beef scrap on hens that they do not want or cannot use and that it may be even dangerous to the health of the hens to do so. With only 10 per cent. in the mash and with beef scraps



almost ad-libitum in the litter a hen can balance up her ration as to beef scrap, and if she needs or can use, two times 10 per cent. it is there for the hunting of it.

There is also no corn meal in this mash formula. In dry mashes it is put there as a coarser to eat, but it is not needed for this in a wet mash and *its got no business in a wet mash anyhow*. Wet mash should be fed to laying hens or to hens that it purposed to have laying, only after the day's work is practically over. A hen whose crop and gizzard are fairly full of grain is not nearly as likely to over-eat on mash as one whose organs of digestion are empty and keen for food. Again, when fed in the morning with a warm mash hens will fill up and then sit around and mope, and a normal hen is never so miserable or so cold as when she has no incentive for occupation. Even a very small mash is undesirable, as working hens on cold mornings quickly glow with warmth from exercise and to dull this by feeding a food that can be bolted, is a mistake.

In late afternoon Rocks and Dotties can have as much as they will eat up clean quickly, but if they show signs of getting too fat, this must be cut down one-third. Leghorn pullets can have an hour or until dark especially if a large flock and any then remaining can be removed at the time of emptying water vessels.

Finally, the term "dry mash" is a mis-nomer in that it is no mash but merely a first hand mixture of ground grains or mill feeds, etc.

#### GREEN AND SUCCULENT FEEDS:

Laying hens simply cannot get along without this kind of food summer or winter. When in Spring these things are at their best, being young and tender, hens are all laying and laying the best eggs of the year. In the winter season such feeds are indispensable in the sense that they add zest to the appetite; seem to aid digestion and to generally keep the hens well satisfied with life. A condition always conducive to a big egg yield.

As a summer green feed, we can put a blue grass pasture, frequently mowed or kept closely cropped by farm animals, easily first. A good meadow treated the same way comes second. The low white clover is next best liked by poultry and close to this or perhaps equal with it plantain with red clover and alfalfa next in order. This in spite of the much heralded value of clover and alfalfa as poultry feeds. If blue grass or even plantain is enough better liked so that hens will eat a good deal more of it and show equal or better results then why talk the clover or alfalfa? Getting right down in the pasture with our hens we can observe time and again that hens will pass these by; at least as long as something better offers. Isolated stalks of either are neglected in an enclosed run until almost the last. When very young the case is different and in the South particularly, we found hens would greedily eat young crimson clover. But the low white clover is eaten anytime. So are plantain leaves and the three blue-grass, white clover (and if wished) plantain, make an ideal pasture for poultry to range on. Not alone are they ideal as feed, but where poultry has to be or is yarded, these all do well on the same sort of soil making a close, long-lived sod.

In the absence of the ability to make an analysis of plantain leaves in order to ascertain their actual nutritive ratio, and with a lively



curiosity to know why hens and growing chicks so liked them, they were fed experimentally at different times as an exclusive green food (and in the winter dried as dried green stuff) and the poultry did uniformly well on them and seemed never to tire of them.

Dandelion leaves are much thought of by some poultry fanciers as green feed, and in fact there are many weeds that hens will pick at and swallow, and this with the fact that most of the seeds of weeds are either bitter or stimulating, would indicate that during the winter season hens must certainly miss these things, unless we feed a substitute in the form of minute quantities of spices, peppers, etc.

(Although not strictly belonging under this heading the matter of feeding spices to laying hens will bear enlarging on here. They should be fed only in very minute quantities, and that they may be properly fed, they should first be very thoroughly incorporated with several hundred times their bulk of the dry mash mixture and then stored for use. When using, a small quantity of this should be thoroughly mixed with the mash mixture before wetting. Salt does not seem to be needed by hens and it too should be fed only as an appetizer and a stimulant).

*Unless a great deal of caution and good sense are observed in their use, these things had better not be fed at all.*

For late fall, winter and early spring feeding there is no one green food in this latitude that can be so easily grown and that is as good for feeding as winter rye planted, not later than August 15th in the northern part of the State, and September 1st for the southern part. Thus sown it will quickly make a strong stand and poultry can pasture on it almost from the first. Or they can be kept from it until the period of grass growth has gone by or until sometime in October; or it can be mowed and cut in a cutter and fed that way. Whenever there is no snow on the ground during the winter, the hens will go for it and it is at least one month ahead of anything else green in the Spring. If sown late the hens quickly eat it to the ground in the fall and perhaps kill it. If sown too early it will make too much growth before wanted, and the dates given are about the right ones to plant. Winter rye as a green food does not unfavorably affect the eggs. This cannot be said of cabbage so much fed and so much recommended as a winter green food. Cabbage fed eggs are miserable table eggs and miserable hatching eggs. If there is nothing else at hand, and rather than feed nothing green, some little cabbage may be fed. However, the practice of hanging it for the hens to jump at to promote "exercise" is silly and often works havoc with hens in full lay. No sensible man would hang a lump of salt twelve or fourteen feet from the ground for a cow heavy with calf to jump at to promote exercise, and no sensible man should do a similar thing for a hen. Sugar beets and mangels are excellent and should be fastened by long spikes to keep them from getting into dirt and filth. The middle of the day when there is least danger of freezing is the time to feed these things, and while only a little is needed *it is important that laying hens in mid-winter have a "bite" of some green or succulent food daily.* Small potatoes and turnips should be fed boiled only and used moderately. They will be best eaten if made part of the mash and not to exceed 25 per cent.

Commercial cut clover or alfalfa or alfalfa meal are best fed thoroughly scalded or even steamed for several hours and the liquid part

of the brew used to mix with the mash. If fed dry they will not eat very much or not nearly enough. If coarsely shredded corn stalks are used for litter, observation would indicate that hens act this about as well as the cut clover and alfalfa. Clover leaves or hay chaff from the hay mows are greedily worked over by hens in winter, presumably as much for the seeds and weed seeds as anything.

When fed underfoot, a very large per cent. of these things are spoiled and uneaten and hence here, where particularly the last ten years large quantities of lawn clippings could be easily obtained and were dried for winter feeding, a method was evolved to feed them without waste and yet in such manner that they would be always before the hens. The scheme is to use four foot lengths of two foot wide one inch poultry netting, laying same flat and covering to a depth of a few inches with lawn clippings. This is then rolled very tightly, fastened up and hung inside the poultry houses within reach of the hens thus providing a bite of green stuff at any and all times of the day with no chance at waste or danger of soiling. (See Fig. 9).

*Lawn clippings dried in the shade as a winter (green) food are so very valuable as a feed to produce winter eggs of a quantity, quality and flavor ranking with Spring laid eggs, that it is worth while to go to this little trouble in feeding them.*

Lawn clippings, too, can be fed fresh cut in this way but of course they will heat and mould unless there is enough poultry to guarantee the roll will be empty in a few hours. Second growth red clover mowed before blossoming, dried on the barn floor or anywhere in the shade and cut in as short lengths as possible can be fed in the same way and in the mash both. And in the absence of lawn clippings, make what is simply an indispensable winter food for laying hens.

Before this subject is left, the importance of a constant supply of absolutely clean water for laying hens should again be emphasized. (See Fig. 10). It is the best "succulent" of all. An egg is about 65 per cent. water, the hen herself about 55 per cent. water and a laying hen is always thirsty. Like her food she likes best to get her water bit by bit. She particularly likes a drink the first thing in the morning and the last thing at night. If she can have constant access to water, it does not matter whether it is cold or warmed. The hen likes it best cold. (If it is going to freeze, warm water should be added). If she has gone thirsty she must not fill up on ice water but such a thing should not happen to a laying hen. She wants most water in the extremes of temperature and when she is laying best, but she wants a chance at water all of the time for water is food in the sense that water aids her digestion of food. She uses up water in this and much passes away in breathing. The breath seems particularly to be laden with moisture, so much so that in a tight house everything quickly becomes damp.

#### SPROUTED OATS:

Sprouted oats were not mentioned under the previous heading, for I have always considered the feeding of sprouted oats as a green food ill-advised and not the proper or most economical way to feed as expensive a food as oats. How sprouted oats fed green could be a cheap feed had always been beyond by arithmetic. Nothing much has



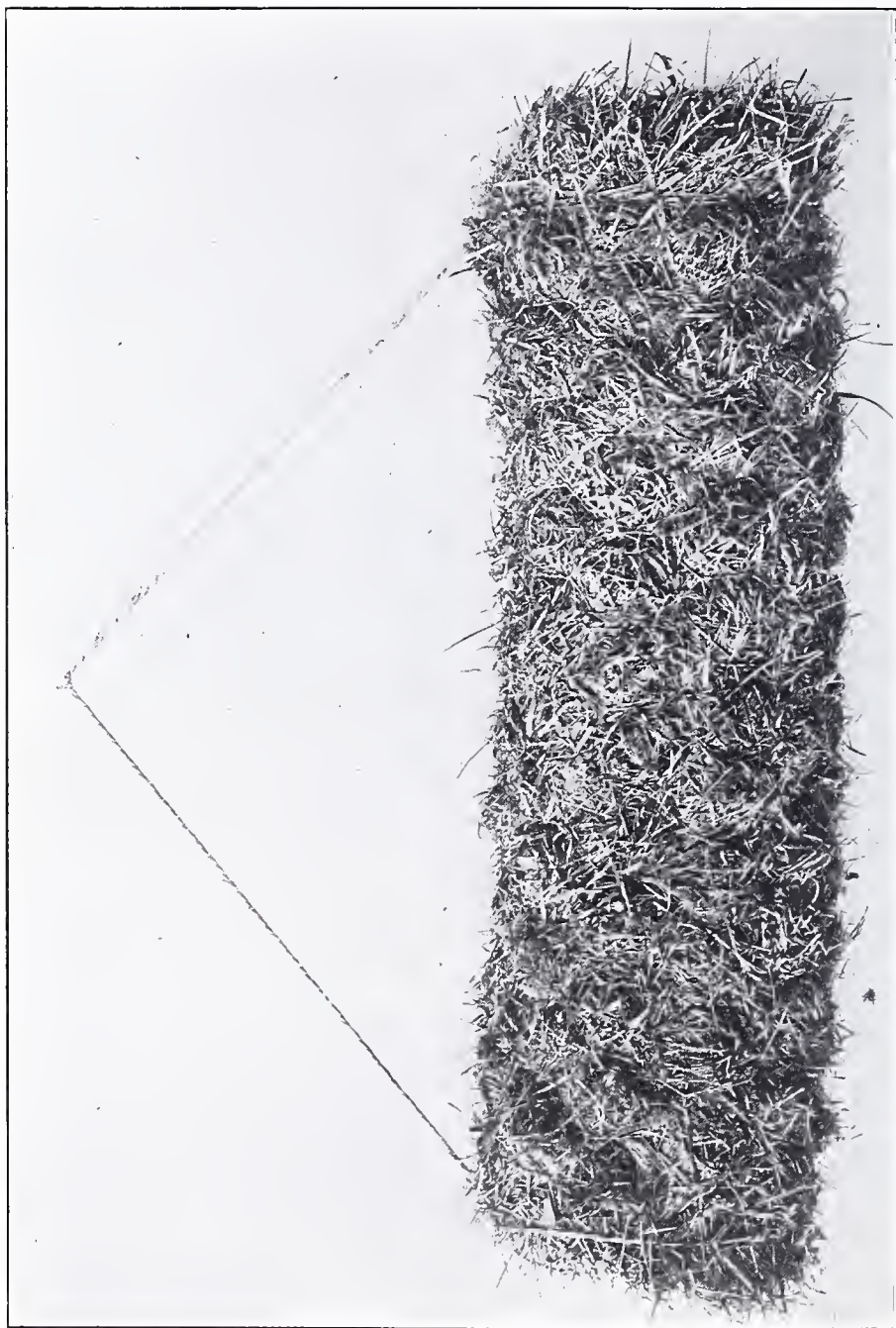


Fig. 9. "Unlimited grass range in mid-winter." Showing about a bushel of blue grass lawn clippings that had been dried in the shade the previous summer, wrapped in an eight foot roll of two inch poultry netting. Such a roll, two feet wide, hung against the wall, within easy reach of the hens will afford them the highly desirable condition above, and one the hens will greedily avail themselves of.



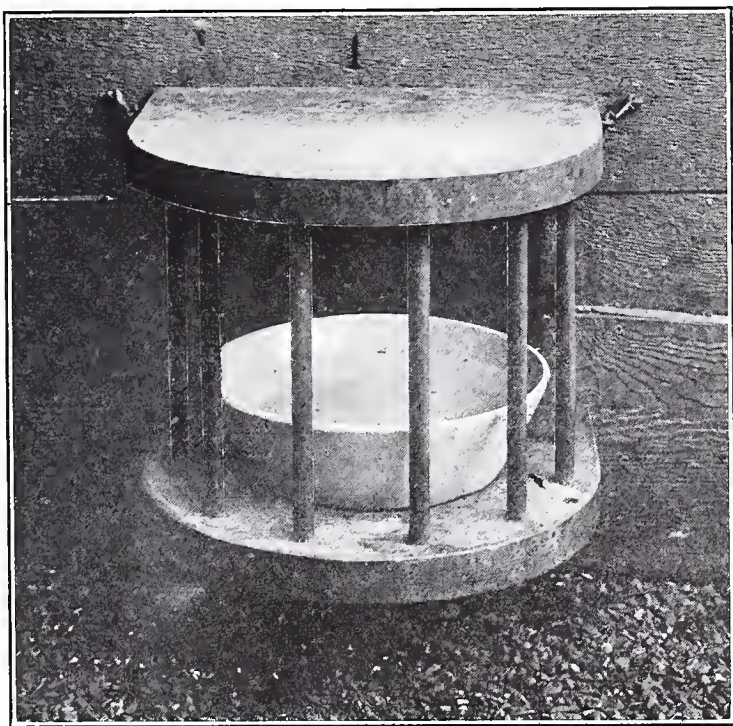
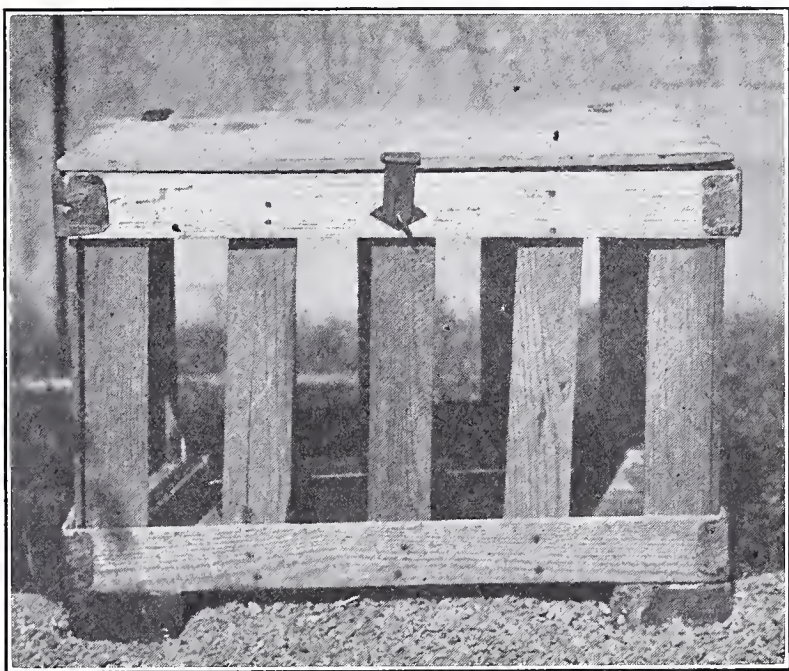


Fig. 10. Showing two simple sanitary devices for supplying water to laying hens. The circular cage is adapted for hanging against the poultry house or fence, and the water dish which is a 10 cent two quart pudding dish is reached through hole closed with a board hung on a single nail. The strawberry crate set on four brick-bats with a four quart enameled dish in centre can be set up anywhere at short notice at small expense. In hot weather when set in the open some sort of roof should be added.



been added but water and while I will freely admit that the tops of green sprouted oats make a dainty relish for hens, and as such in the winter are valuable, I should consider them as a mere salad and not a food.

When we sprout oats in a proper temperature, which is a temperature, that will sprout them quickly, or when the sprouts average one-half to three-fourths of an inch we have converted the starch of the oats into sugar (they are sweet to the human palate even, at this stage), and we have converted a grain that is usually unpalatable to poultry into a palatable and highly relished food. In accomplishing these two things we have gained two big points.

When we continue the sprouting under a high temperature the sugar evolved ferments and sours and the next stage is a musty odor akin to moldiness. To say the least the two last stages have never appealed to me as being good stages for poultry foods. With a lot of hens to feed making it worth while to make it a regular business of sprouting oats, with a proper equipment, or with a furnace in a cellar giving the requisite temperature, feeding oats in a sprouted form may be economical and desirable. But where with a few hens an attempt is made to do it in the kitchen or living room it is more fuss and bother than results warrant. Practically equivalent to sprouting oats is to swell them as if they were to be sprouted and then slowly cook or steam them until all the water is evaporated. Fed thus they are a splendid substitute for hulled oats for growing chicks and chickens old and young always eat them greedily.

Another and very valuable form of "sprouted oats" is, that in which oats are grubbed in bare yards. Hens get more benefit out of this sort of grain—green food feeding than anything else that can be used in bare yards. By grubbing over a bare yard weekly and planting oats simultaneously the danger of soil contamination is greatly reduced and if some grass is fed daily besides, the lack of grass range will be great minimized.

#### ANIMAL FOOD:

It is not what a hen eats, it is what she digests that counts. And until we have an authoritative table that will apply to all hens, what proportion of the food consumed is digested, our standard for feeding will have to be gauged by such things, as the likes and dislikes hens of various breeds show for different foods; by the results we get when various feeds are fed; and lastly by the droppings. Even without the aid of the analysis of the droppings constant and close observation of same will be a most reliable guide-board to the student of feeding. The study or knowledge of the story told by the droppings is unfortunately much neglected as yet.

*Hens never omit meat, or its equivalent, worms and insects, by choice from their diet.* They are born meat hungry and it sticks to them as long as they live. The natural expression of this is in the search and capture of insects of many kinds, worms, etc. When meat is fed as a substitute for these things, or when fed to re-inforce them it is best fed in the form of fresh lean meat slightly cooked. Any considerable amount of raw meat or of fat, raw or cooked, disturbs digestion.

*Large quantities of meat fed to meat starved hens is always harmful and it were better even to feed no meat at all than to feed it feast and famine fashion.*



If meat is boiled it will keep longer so that a little can be fed daily; the larger amount of the fat can be more readily removed and what food values have escaped into the water used in boiling can be conserved by using to mix the mash. If much fat is present the liquid too must be skimmed for fat.

Green cut bone is excellent particularly if calf and other soft and meat attached bones can be had. It must be fed in moderation though and feeding a little every day is the only way to feed it. Feeding a great big feed once a week too will do more harm than good.

Spoiled meat or bone should never be fed to hens, and unless extra pains are taken to make scrupulously clean the bone cutter after every using, it had better not be used in the summer on account of the great danger of ptomaine poisoning.

If beef scraps are good they combine in themselves the easiest had and the easiest fed of all the various meat foods. Unfortunately even the best brands of beef scraps on the market vary in quality and it is always a safe plan to carefully watch the effects of each new lot. Personally, I don't pay much attention to the analysis, being more particular to see that they are not too greasy or smell too much like fertilizer or are not too "wooly," and I am willing to pay a high price to get a good beef scrap or meat meal, being convinced this is cheapest in the end.

To feed beef scrap in litter it should be put through an ordinary grain sieve and the coarser particles fed like grain. The fine part to be fed in mash. Coarse beef scraps thus sifted can be fed in litter without waste and if not mixed in as a part of the grain ration a better way will be to have plenty of them in the litter all the time. *Each hen can be trusted to eat the amount that she can use.* Neither should be kept in bags for unless heavily "doped" meat will heat and spoil if so stored. If spread out in a dry, airy place it will keep perfectly. Blood from slaughter houses boiled in a bag makes a very good meat feed, but it too is very fussy in its preparation and feeding.

Skimmed milk is another valuable animal poultry food as far as it goes. It can be readily used to mix in the mash and is fine for this. If placed before hens as a drink they are likely to soil and make sticky and dirty the plumage and all else near, and as cleanliness both of the hen and her surroundings are imperative, if good eggs and plenty of them are to be produced, milk should not be fed this way. Milk as a drink will not take the place of water and laying hens want a daily amount of animal protein far beyond what they can get at through milk.

#### GRIT, SHELL AND CHARCOAL:

A great many farms never had a good natural supply of grit for poultry. On other farms what there was is worn out and in the winter season with everything frozen up and covered with snow, there is a shortage always. Therefore, as long as grit can be procured so easily and cheaply there should be a bin or bag for it on every place where poultry is kept.

The theory that hens swallow grit as grinders is the only one that appeals to me and if grit is used for grinding or rubbing food into fineness then it will pay to supply grit all the time. Grit, to my mind,

is indirectly the mill that grinds out the eggs. Granite broken to the size of corn makes the best grit, and it can be bought almost anywhere in hundred pound bags. Limestone is a good second and is put up and sold the same way. At stone crushers it can usually be had by the ton very cheaply. Broken crockery pounded into bits has all the attributes of a good grit being hard and sharp. Even glass is eaten and used by hens as grit. Small rounded pebbles are not grit. Neither are coal ashes or crushed oyster shells. The way to feed grit is to always have an abundant supply in the litter so that while searching for food it is always before the hen.

A hen must have mineral matter in the form of lime to make egg shells off.

Corn is very low in lime. Wheat bran is richer and clover hay, beef scraps and bone steadily ascend the scale. But our rations for hens as usually compounded are all short in supplying the large amount of lime needed by a hen that is to lay a large number of eggs.

*Hens under normal conditions will not lay eggs faster than they have the shells to put them in.*

In crushed oyster shells we have for the hen a cheap and easily obtained source of lime. When properly prepared commercially the shells should be washed before crushing and the product then thoroughly screened. Such shells are bright and clean in the bag and can be had at a cost of not over one cent a pound. If very old they seem to lose some of their value.

With grit, there should always be a plentiful supply of shell in the litter. I am convinced hens will eat and use a great deal more of both when fed in litter than when hanging against the poultry house walls in some dusty hopper or box. When in full lay and the supply of lime runs short hens will lay thin shelled eggs, will pick at white-washed buildings and may even start eating eggs and finally will quit laying. Without doubt many hens quit laying because their supply of lime to cover eggs with has become exhausted.

The claim that hens will lay fine heavy-shelled eggs without getting a bit of supplied lime in the form of oyster shell, etc., can be explained by reasoning that a hen resting or not laying during the winter stores up in her system slowly from the foods she eats (all of which contain some lime), lime against that day of need when she resumes laying.

A perfectly well hen has no use for charcoal and won't eat it. But under our **high feeding** the state of digestion is often such hens crave charcoal and will then greedily eat it. Hence, it should be, with grit and shell, always within reach. Feeding it in the mash is not necessary. It may do no harm outside of making the mash unpalatable but the better way is to trust the hen to eat it when she needs it.

#### A SUMMARY ON FEEDING AND A METHOD OF FEEDING FOR EXTRA HEAVY WINTER EGG PRODUCTION.

Feeding might be said to be commulative. If the chick is not fed right the hen will never after be a maximum feeder or producer of eggs because the digestion and appetite will not be trained to do its best. A heavy layer is in reality an egg machine and a hen kept for laying should always be thought of as such. If an egg is a new chicken and a hen is to lay 180 or 200 eggs (new chickens) in one year she has to eat and digest a wonderful amount of food. She has to go

on the roost night after night with her crop packed. She has to swell, to grind and assimilate that much food or she has to turn large quantities of food into blood, and from the blood evolve the eggs.

Hence, the objection to raising pullets destined to be kept for layers in small quarters. The feeding of such growing poultry must necessarily be complicated if it is to be at all successful. And after the feeding is completed and the pullet is grown the result is an appetite and digestion pampered, unready and unfit for the strain of the work of heavy egg production.

If town and village people and others keeping hens in small quarters would only realize this and instead of trying to raise their laying stock, they would buy in the Fall well grown, free range pullets from stock where some attention had been paid to increasing productiveness by breeding, they would have a laying stock that would not only be ready to be fed but that would respond to good feeding.

*Given everything else, the ultimate results depend upon the feeder—upon the man.*

And while I do not pretend that the following method will guaranteed a big egg yield for every one, I can say that it is a method that has been slowly evolved out of many years experience and a pride, beginning in boyhood, in the ability to make hens lay. All of it has been tested and retested at every point.

The first requisite is to have pullets that are uniformly matured and ready to lay by the early part of October or November. The next is an especial effort to supply a great abundance of succulent green food and meat food at this time when usually a great shortage of these things, by reason of frost, are forced on poultry. Besides this they are introduced to dried lawn clippings or cut clover. It does not matter much if they are taken off the range or not. Sometimes I believe it is best if they are. Not meaning that they be shut up in a house but that the range be restricted to a liberal yard so that the feed and the feeding and the habits may be under absolute control. If a disposition is shown to rove around to excess in the cold, chill Fall rains the pullets must be penned on such days and extra pains taken to keep them busy indoors and to establish this habit. These too are especially favorable days to get acquainted with your layers and to cultivate in them an easy tolerance and confidence in you. They must be got to "talking" and "singing." A coxer along this line is shreds of some slightly boiled fresh, lean meat fed from the hand. This establishment of confidence and content will fail to a great extent if merely mechanical on the part of the owner, and not animating from a love of the business. It is as possible with a flock of one thousand hens as with a flock of a dozen.

The next step is to coax on heavy feeding and yet heavier feeding and do this with a nicety that will not suffer the appetites to pall or lessen in the least. At this time the fowls must be visited every night and as they sit on the roosts each individual crop should be felt. And here we have the next requisite: Every pullet whose crop is only slightly full or empty must be examined and a leg-band record made and if she is found night after night with her crop thus she must be removed or go to the butcher. If the pullets were moved to winter quarters or to a new place, it is best to have them real hungry the first few days as excitement with much food will greatly disturb digestion. It will also greatly extend the time needed to get ac-



quainted. For a hungry pullet with inviting deep litter will quickly forget she has been moved. The next requisite is a thorough examination for lice and for scale on feet or legs. Every bird with signs of either must be treated. All this to be done at night only and very quietly so that the pullets be not unduly scared or frightened.

A wide open front for the house is the next thing to be looked to. Or roosting that has as much ventilation as all out-doors and yet is perfectly sheltered from draughts and weather. It is proposed that these pullets roost thus all winter and it is highly important that this is begun in early fall. *There will thus be no frosted combs and there will be a great many more eggs than in a tight or "warm" house.* This idea has seen a twelve winters' test here, including various breeds, and Leghorns every year and has uniformly so worked out.

The grain ration varies slightly from year to year depending somewhat upon the price of certain grains and the ease with which they can be had and partly upon the variety or breed kept. It is substantially as given in this chapter. Wet mash only is fed and the method of feeding as outlined previously is closely followed out. Lawn clippings and cut clover are made much of and the former, besides being fed in the poultry neeting rolls, is in moderate weather fed also by sousing in the water dishes.

No effort is made to bring about summer conditions so far as warmth is concerned, in fact, the cold is valued as an aid to good appetites and heavy feeding. Summer conditions are attempted in the way the hens are fed or kept occupied at scratching in litter and in feeding the abundance of substitutes for green stuff and animal food common to the summer season. It is the aim to have all the birds in full lay no later than November 15th and to keep them so during the following two months or the months of greatest difficulty to get hens to lay.

With the high prices the city consumer has been willing to pay the producer the last few years for choice table eggs, it is made possible to clear \$2.00 profit on each hen in the six months, October 15th to April 15th.

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## HOUSES AND YARDS

### THE HANDICAP OF A POOR HOUSE:

A study of the very many different kinds of poultry houses found in different sections of the country impresses one strongly only on one point; the total lack of consideration or knowledge of what is required to make an ideal or even a good poultry house. As poultry houses run it is probable that 90 per cent. defeat the very purpose for which they were supposedly built. Poultry houses are supposed primarily to be houses for the poultry, and such houses as will help to make it possible to keep poultry at a financial gain.

If poultry won't live in a poultry house during bad weather unless they are penned in, or if a poultry house is so planned or constructed or is so used that the results in pounds of meat and dozens of eggs is actually decreased by reason of it, then it is high time that this probable 90 per cent. of houses of this class are altered or are rebuilt. Many of our farms are ideally located for keeping poultry. Many of our farmers or farmers' wives and villagers are fairly good

poultry keepers. Others have invested in first class pure-bred stock. And yet it often happens that all these qualifications to successful poultry keeping are largely nullified by the unadaptability of the poultry house used.

There has been enough money spent, too, on poultry houses in this State where practically everywhere now-a-days the poultry has at least a house and a house of its own. And, yet, in spite of this fully sufficient amount of money that has been spent on poultry houses, in the building thereof they seemed mostly to have just happened. If one idea predominates in them it was the idea of warmth and of getting the largest amount of glass possible in them.

#### A GOOD HOUSE NOT A HIGH PRICED HOUSE:

Expending a lot of money in building a poultry house is unnecessary. Most of the expensive houses turn out in use to be the very poorest kind of houses. However, unless built of second-hand materials or merely as a make-shift or as a temporary house, a good poultry house in these days of high-priced lumber and labor costs good money. Hence there are special good reasons for stopping the waste of building poorly adapted poultry houses that hinder rather than help making of poultry keeping a success. Ordinarily it will cost from one to two dollars per fowl capacity to build a poultry house substantial enough to last a lifetime and good enough to make it possible to get therefrom the maximum results in the way of health and comfort for the poultry and dollars and cents for the owner. The wonderfully (and fearfully) constructed "complete" poultry houses worked out by some theorists always belong in the expensive or "high cost" class; as well as the great majority that have been built as it would seem, without any theory or plan at all.

#### OUR WRONG IDEAS AS TO POULTRY HOUSES:

Occasionally we find whole neighborhoods with practically the same kind of poultry houses, due usually to the fact that they were all built by one carpenter or that neighbors were simply blindly following each other. The faults of the common poultry house are so many and so universal it seems hardly worth the space to more fully go into them. That it would be highly profitable to rebuild or replace most faulty poultry houses is a sure thing, and that it would have paid and that it will pay now for the average individual to get expert advice before building, cannot be gain-said.

One of the best things in poultry house architecture and one we have fortunately been hearing a lot of the last few years are

#### THE CURTAIN FRONT, FRESH AIR HOUSES:

By some these houses are spoken of as the "open air" or "open front" poultry houses, by others merely as "cold" poultry houses and others using no curtain as simply "fresh air" poultry houses. They vary in type but practically all embody the same broad principle: an abundance of fresh out-door air winter and summer, day and night.

To many even yet this seems a most radical even revolutionary departure from all accepted ideas and theories as to poultry housing. I have found many people who have argued with me that the idea was not a good one or a sound one, or even a safe one (having in mind frozen combs, frozen eggs and the probability of no eggs at all in win-

ter), but I have never yet found a single individual who has tried it that has not spoken highly of it. Some will get greater benefits or reap a bigger difference than others, many times due to the fact that while they accept the theory, they will go only half way or part way in practice.

*The old theory that hens to lay well in the winter had to have a warm tight house was no good in that it would only work occasionally. The new theory that the house was to be flooded with fresh, cold, pure air all the time and at the same time be a good shelter brings about conditions whereby it is possible to have a good winter egg yield every season.*

This use of cold, fresh air brought about by the adoption of the open front house has brought many poultry people to the point where they have no longer fear or even look for that old time dreadful winter scourge of poultry, the roup. One of the finest things about this use of open front houses is that the wonderful stimulating and health giving properties of the abundance of fresh air supplied are cumulative and the poultry takes on new life and is in effect in a few generations really a different kind of poultry. Poultry that has been kept for successive generations in a good open front house and otherwise well cared for rarely is sick. The eggs hatch, the chicks live, in short a chicken keeping with most of the ills omitted is made possible.

A few poultrymen will go even a little further and claim trap nest records showing that in open front houses they can get more eggs out of a certain number of hens of the American class in cold weather than at any one other season of the year.

I have used a wide open and a curtain front house and variations of same for the last twelve years and I know whereof I talk, when I advocate no other style of house but an open front one, although I did not use such a system until I was literally forced to it. After finding how beautifully it worked I went pretty near the limit and I feel very sure to-day that under certain circumstances in the climate of Southern Pennsylvania, the limit can safely be gone and a house can be not only "open front" but it can have cracks and holes elsewhere. Yet, as a general proposition the only safe open front and curtain front and fresh air poultry houses are those open to the south only; the north, east and west sides perfectly tight with a floor and roof the same way.

After all we do not really want a *cold* house. Thousands and tens of thousands of poultry houses are already too cold, and lest anyone get the impression from this talk of open front houses that a cold house is the objective, let us state at once that is not the idea. A great many tightly closed houses belong under the category "of already too cold." It is one of the follies of the tightly closed and glass type of houses that they are often full of the damp cold that strikes to the marrow.

*A good model of an open front house is the warmest possible type of house to build.*

A test of a good poultry house is whether the poultry is living in it. If it is a good house, if the poultry is driven out of it in bad weather it will go rich back. If poultry won't stay in a house in bad weather and loaf or are miserable, huddled somewhere about the farm buildings, there is something wrong with the house.



*A good poultry house is something like this: has just as much fresh air as all outdoors; has just as much sunshine as all outdoors; has just as much light and brightness as all outdoors and besides all this is a good shelter.*

This type of house may cost very little money outside of labor. I have seen it made up of walls of old fence rails banked with corn stalks; roof thatched with straw; floor merely earth deeply littered; the front a curtain made of old bags.

Undoubtedly a fairly low house makes the best shelter and while the great point is to make the poultry house a good house for the hens, some slight concession must be made to the convenience of the keeper. One of these is to make the house so high an ordinary man can work therein, and stop short there.

#### A FARM POULTRY HOUSE:

The photograph of a curtain front fresh air house on the opposite page shows what first of all is rather a neat looking and attractive house. (See Fig. 11). One whose cost of construction is low and that is so simple that nearly anyone that can use hammer and saw can build it. There are no frills and not a useless foot of lumber called for.

The house shown can be turned into a wide open house or a snug, tight one at a moment's notice, allowing for comfort inside with a wide variation outside. It has no floor furniture, making available every foot of the floor for clean, deep litter, and for sunshine, light and fresh air, Nature's best germicide and most tremendous influence for health and vigor. Driving rains and snows are easily and completely kept out. No small exit door when located in enclosed yard. Nests darkened, readily converted into trap nests. All cleaning of dropping boards, handling of fowls and gathering of eggs, and other work done from the front and no troublesome, complicated and expensive devices of any sort.

This house is not an automatic house but comes very close to it. It is planned to simplify poultry keeping, and the getting away from complicated methods and appliances which are rarely used—and clutter up things. While a good, practical house, if built exactly as per directions, it is not by any means the only good poultry house. It is a poultry house suitable for the ordinary farm.

#### CITY AND VILLAGE POULTRY HOUSES:

This house will do nicely for city and village poultry keepers, but unless the house is especially intended to be attractive, usually a simpler and cheaper house will answer, as usually there is a great deal more protection for houses as against the country, and again, they are usually required for a much shorter period of years.

*The great big mistake most city and village people make in building a poultry house is building it of a size out of all proportion to the amount of ground they have for poultry.*

#### FOUNDATION:

In these days of almost universal use of cement, nearly everyone is acquainted with its economical mixture and use in building concrete walls, and such walls carried below frost line and of six to eight

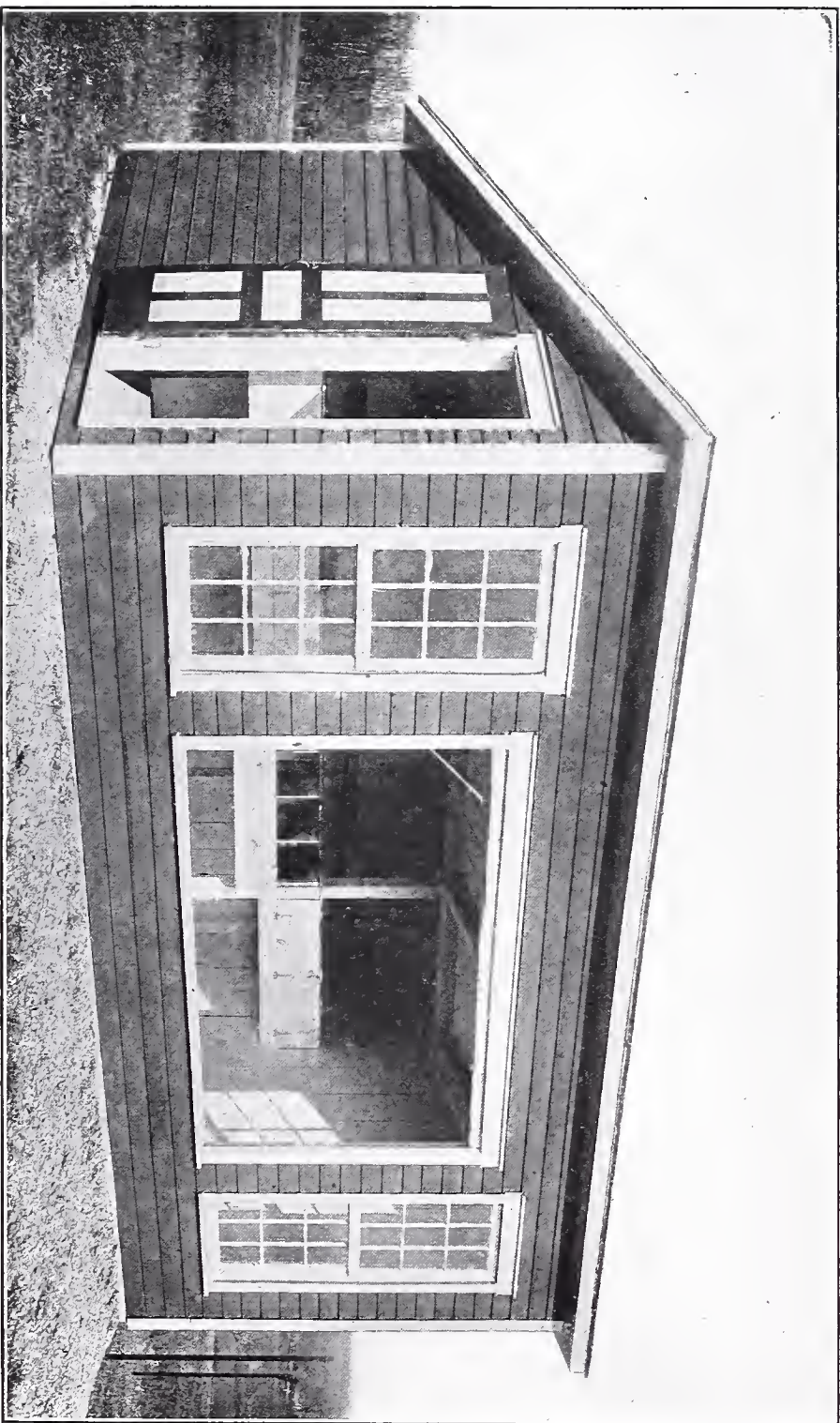


Fig. 11. Witman's Curtain Front Fresh Air Poultry House.







*Miscellaneous:*

- 2 Pr. sash frames—9-8" x 10" lights to sash,
- 1 stock door,
- Building paper to cover 700 sq. ft.
- 2-ply roofing paper to cover 325 sq. ft.,
- 10 oz. duck 10'6" x 6'0",
- 1 pc.  $\frac{3}{4}$ " G. T. pipe 10'6" long.

*Hardware and Glass:*

- 1—Mortise door lock,
- 2—1" x  $\frac{1}{4}$ " G. T. pulleys, with staples, cleat, and 40'— $\frac{1}{4}$ " rope,
- 8 pr. hinges, with catches (for nests) nails, etc.,
- 36 lights—8" x 10"—single thickness,
- 4 gals. oil paint for outside,
- 4 gals. cold water paint for inside.

## WINDOWS AND CURTAINS:

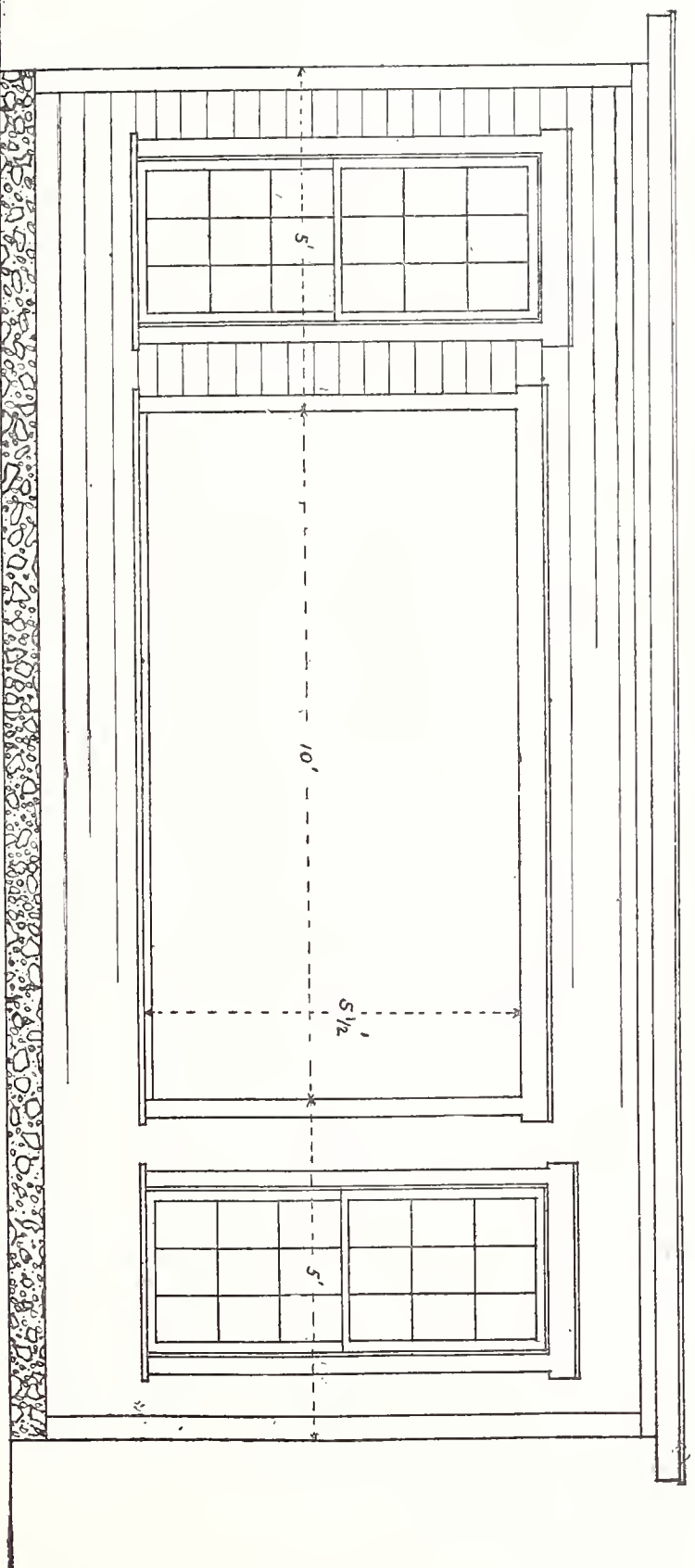
The section plan shows a six inch space left below joist to tack curtain to, and there is a six-inch sill to carry off water when curtain is down. This curtain, when made out of 10-ounce duck will last for a great many years. Old sail cloth does just as well. Or heavy muslin or even burlap can be used. There is a three-fourth inch second-hand pipe in hem at bottom and the whole, when hung with pulleys and rope similar to the ordinary porch screen, can readily be raised or lowered at the will of the attendant. On each end hem four ordinary carriage sockets are inserted at regular intervals making it possible to button curtain down and make all snug and tight.

However, this curtain should be used with discretion. Unless in a driving equinoxial storm it be let down part way to keep out rain, it need not be used before Thanksgiving and merely to keep out cold, usually not before Christmas. As it can be adjusted at any height it can be left down during cold nights to within six, twelve or eighteen inches of the sill, thus increasing the heat banking capacity or lessening the air current possibility of the house. The pure air and the warm air can be depended to bank itself in the higher parts of the house and when we lower the curtain we conserve this air. With the curtain of duck it should never be entirely closed except perhaps during blizzard weather and very severe cold snaps.

*Every winter day that the sun shines the curtain should be all the way up.*

When erecting the building, studs are so placed (this is important) as to leave a four-inch space for curtain lap and curtain buttons. The curtain, before hanging, should measure ten feet six inches, by six feet. To have the curtain on a frame destroys the nicety and the readiness with which it can be adjusted for cold nights. Also curtains on the much advised frames are a nuisance to put up and down, are apt to scare the poultry in doing this, and hung up against the roof are great dirt collectors. Using muslin in the window frames to let in air is mostly a delusion, as the muslin will get wet during rains and the dust from the house settling thereon will quickly seal it or make it air proof.

The spaces on each side of the curtain opening are five feet, with the windows in the centre. The sash may be second hand and the exact size is not material. The area of glass in this house is kept down to that amount which will not materially affect the inside temperature either day or night and yet supply sufficient light, on dreary cold and blizzardly days when the curtain is down, to keep the hens at



# FRONT ELEVATION

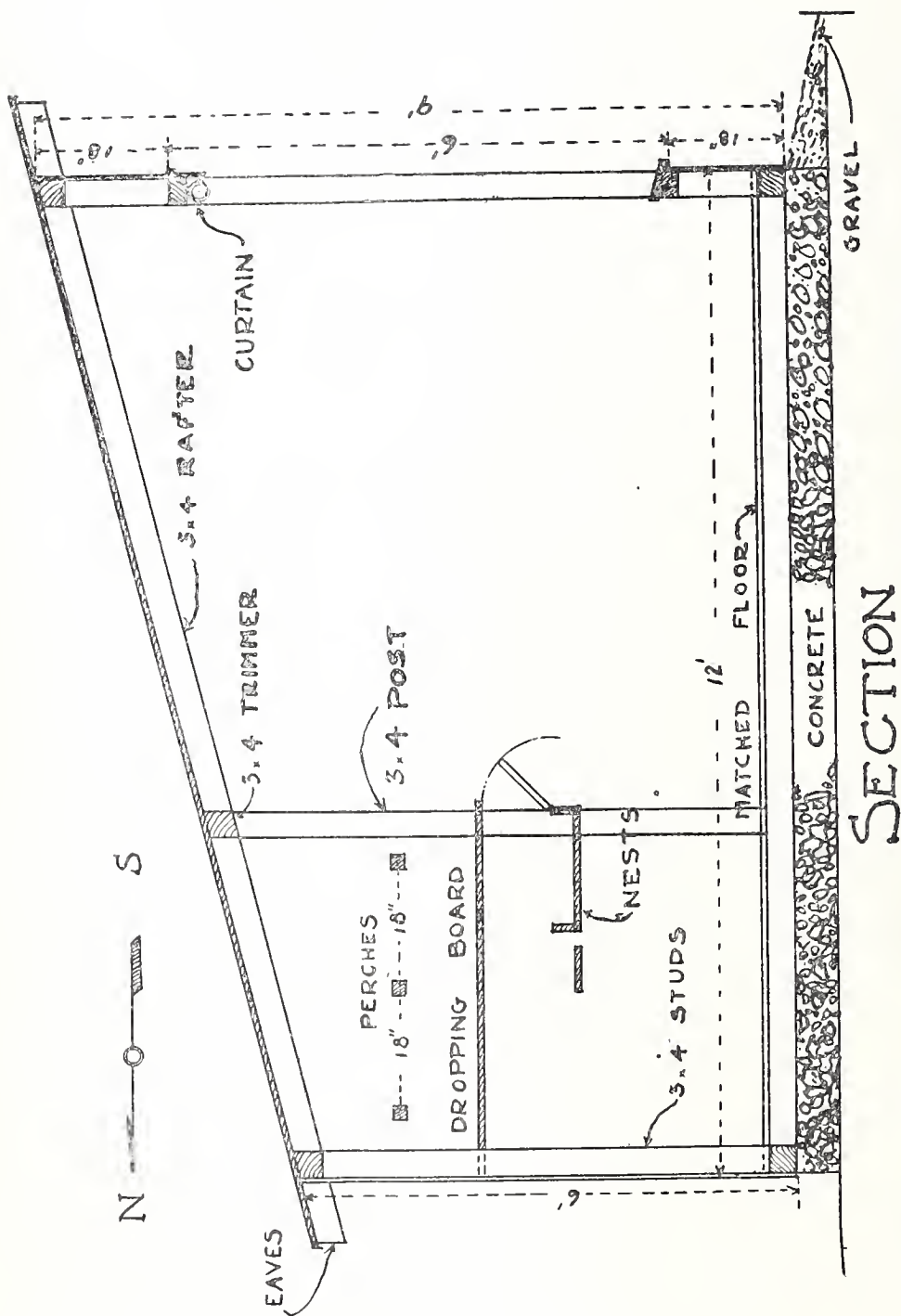
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Plan 4. The exact placing of the big opening above is very important, so that the rays of the winter sun may strike clear to the back wall. If placed too high the principle of the house is interfered with, if placed too low it is wrong again. If brought to one side or end of building it is wrong again, as the north wind will swirl around the corner and into the house.









Plan 5. Sills of this house are 4"; floor 1"; rafters 4"; leaving inside space at rear walls 5' 3" and the space immediately in front of dropping boards about 6' 9". For scale see Plan 4.



work. Frames to fit sash can be made on the spot with provision made to allow the removal of the sash. The sash is to be out April to October and to leave it in during this time is to partly defeat the good of this house.

#### ROOSTS AND DROPPING BOARDS:

Reference to the section plan will readily explain how built. With all fresh air houses it is important that roosts be as far removed from the front opening as possible. That they be all on one level if the hens are to be contented and that there be a dropping board not only for the purpose of catching the droppings but for breaking up any stray gusts or rising currents of air. These dropping boards or platforms should be made of tongued and grooved stuff and always kept covered with a half to three-fourth inch of clean loam or sand.

*In this way the dropping boards will absorb none of the manure and always remain clean and sweet as when first put it.*

Another advantage of using loam or sand on the boards is in the way the value of the manure is preserved. A most considerable item. It also allows of the ready and pleasant cleaning of the dropping boards by using a small home-made rake with either wooden or wire nail teeth spaced one-fourth inch apart. Width of dropping board is four feet six inches. Height from floor three feet, three inches and projecting one and one-half inches beyond nests to facilitate cleaning. Roosts are two by two stuff, slightly rounded and spaced eighteen inches centre to centre, raised ten inches above dropping board.

Nest platform width over all is two feet two inches, with two inch space; width of alighting board being six inches. There are sixteen nests with inside depth one foot four inches. Front width one foot one inch and height the same. The doors are in four sections, (hens enter from the rear, eggs are gathered from the front by opening these doors) and are ten inches wide with strip below them three inches.

*These nests fulfill every requirement of a good nest, being one exactly like the other and all easily reached; are darkened and retired, and eggs can be readily and quickly gathered from the front.*

To make trap nests, of them all that is required is to arrange one of the various and very simple trap door devices at the entrances.

#### FLOORS:

The good old-fashioned floors for poultry houses were merely old Mother Earth, but in building a good house it will pay to put in a good floor. The best of all floors is a tongue-and-groove board floor. A board floor as against an earth floor will save enough litter or enough labor in changing litter to pay over and over again for its higher cost. No matter how an earth floor is filled in or built up, capillary attraction at certain seasons of the year is bound to make the litter damp. At other times an earth floor will be dusty and one of the things absolutely not wanted in an up-to-date poultry house is dust. Even with a wide open front there will be some poultry suffering with bronchitis, catarrh and even roup if the house is dusty. Dust laden air is always disease laden air and creates conditions in poultry houses that are obnoxious both to the hens and the man who has to work in it.

*Air slacked lime is another thing to keep out of a good poultry house, and particularly to keep off the dropping boards and away from the manure.*

Floors of cement are coming into use but unless insulated by the use of tar and tarred felt, are cold and will under certain winter weather conditions also attract dampness and transfer this to the litter. With sand, crushed stone, gravel or cinders and labor free and nothing to buy but the cement, a concrete floor is the cheapest, but if all these things have to be paid for it is the higher priced, and if it is to be insulated there is an extra added expense. If the house is ever to be moved the cement floor is lost and its one great virtue of being rat proof can also supply to a board floor if as in the house under consideration there is a concrete foundation taken below frost line and brought up a fair distance above the ground level.

The entire floor space should be for the hens, covered with litter, fresh air and sunshine. Thus used a board floor will take on a shining smoothness and be as clean, as dry and as sanitary as the top of a dining room table; in fact the idea is that the floor in this house be the winter feeding table for the hens. The curtain being up nearly every day and there being a clean, sunny spot right out doors the mash is usually fed there; the water is there also, or it may be hung against the wall inside.

#### LOCATION:

The location or site of a poultry house or of a poultry plant is deserving of a great deal more attention than is usually accorded it. Usually without a good natural location, poultry keeping as a business proposition had better be let alone.

Some farms do not have a good place for a poultry house anywhere within convenient distance of the house or other farm buildings and then it becomes a question whether to keep much poultry or not. On the other hand the worst location possible for a poultry house is to have it so near the barn and the piggery that the hens will live on the manure pile from the former and the filth from the latter. Poultry intended for human consumption or for laying clean, sanitary eggs, should not have ready access to these places. In fact the writer is firmly convinced that the reason so much of our poultry are degenerate and unprofitable "dung-hills" is because on many of our farms they are virtually brought up and pass their lives on the dung-hill.

Poultry living next door too and on top of a manure pile never attains normal size or weight. Has no sheen to its plumage. Lacks brightness of eye. Has a foul breath and lays eggs with the taint of the dung-hill in them.

*The first consideration in the location of a poultry house is drainage.* Air drainage and water drainage both. A low place may seem well sheltered from the cold and yet usually is a much colder location than one where both water and air drainage are better.

Low places are always to be avoided. Where the ground is wet it is apt to be cold. Where it is wet it will taint very quickly. Will become filthy, and will foul plumage and feet and be carried into the nest, making for dirty eggs. The litter in the house also will soon be wet and foul if right outdoors the soil is wet and muddy.

*To build a poultry house at a low place where the ground is wet and cold and muddy and swamp even, is like throwing money away.*

Another objection to a low place is that cold air settles in low places, which at certain seasons when the air is frosty and foggy makes for very unhealthy conditions for poultry. Therefore, even if the ground at a low place should happen to be dry and it usually is not, even then it is not a good location for a poultry house. For the air drainage is almost of as much importance as the soil drainage.

Fortunately, oftentimes within several hundred yards of a poor location can be found a good one or a fairly good one. But if it be necessary, a still greater distance should be gone for a good, natural location for a poultry house, is such a great start to success with poultry that it is worth while going some distance for it.

*A hillside or a slope, with a southern or south-eastern exposure sheltered to the north and west by hills, or mountains or by woods even is an almost ideal location for a poultry house.* To secure warmth and shelter from cold winter winds by getting in the lee of some wind break is always desirable and where this is impossible it may be worth while to build a temporary one of cornstalks and fence rails or plant a permanent one in the shape of some of the evergreen trees.

*A location facing the south makes for warmth and dryness and cheerfulness for the most hours of the winter days.* On the other hand, such a location should include some natural shade for the summer season or it may become insufferably hot. If there is none, some should be planted at once and temporary shade shelters be provided until the former becomes available.

Next to a southern exposure, an eastern one is to be preferred. Provided the particular location is not readily accessible to prevailing chilly east winds.

Few locations make a western exposure desirable, and that some people should still continue to build poultry houses on a northern exposure in this State is beyond comprehension.

Occasionally, when there is no good natural location, as for instance on the top of a wind swept plateau, the style of building may be changed to meet conditions as they exist. Or, it may even pay to shift some earth, plant a privet hedge or a more substantial wind-break so the poultry may be within reasonable distance of the house. The poultry house is one likely to be visited at least once every day in the year and the saving of steps and time in the course of years make it well worth while when necessary, to artificially make a good location.

A splendid location for the poultry house is in the apple orchard. Or, if there is such, in the pear or plum orchard. Many of our poultry buildings that at present are huddled in close proximity to other farm buildings, if moved into the farm orchard, would give the poultry on the place a new lease of life and yearly put a great many extra fruit dollars into the owner's pockets.

The farm orchard provides these three essentials for many eggs and healthy stock; plenty of clean, grass range; a multitude of insect life; shade and coolness during the heat of summer.



## SOILS AND DRAINAGE:

Any sort of soil is usually considered good enough to grow chickens on. However, all other things being equal, the better soil will grow the better chickens. On the other hand waste soil and poor soil can be made to do fairly well. However, the poorer the land the fewer number of chickens it will carry per acre.

In buying land for poultry keeping this fact should always be born in mind: that if land is cheap because it is poor, more acres will be needed. A heavy clay is the most undesirable of all soils on which to keep poultry. Such soils taint or sour quickly. Hold water and hence are cold and wet, making early small chickens almost impossible; besides that pest of small chickens, gapes, is always at its worst on the clay soils.

A warm, loose soil is best. It may be gravelly or it may be sandy, only so that it is porous. Where the soil is deep, pure sand it is remarkable how the ground will stand heavy stocking with poultry for many years. Warm, porous soil is usually soil that is naturally well drained. Frequently soil conditions could be greatly improved in the neighborhood of poultry houses by simply plowing or opening, surface drains.

Wherever the soils are inclined to be heavy it will be abundantly worth while each fall to haul several loads of course sand, or gravel, or crushed stone, or ashes even, immediately in front of the poultry building. (See Fig. 11). For the ground here during winter and spring is bound to become well fouled and with alternate thawing and freezing will be a filthy pest hole for chickens to wade in. A few loads of fine gravel or crushed stone will change all this, as every heavy rain will wash all manure and filth out of sight and the gravel in the front of the house will be dry, warm and clean. Experience will show that snow needs be shoveled off this only roughly as the sun will quickly cause the balance to melt and disappear.

Where poultry is kept in very small yards in cities and villages, if the ground be excavated for a depth of eighteen to twenty-four inches or where a fill to this depth is possible and the first twelve inches be filled with ashes or cinders and the balance with fine gravel, there will be no foul yards and no foul odors. For the use of a rake and the help of heavy showers and rains will guarantee the top always clean and sweet. I know of such city poultry yards in use twelve and fifteen years that are to all intents as clean and sweet as at the start. Probably, provided same could be had cheaply, a fill of pure, sharp sand for the whole depth would do just as well.

## UNDERDRAINAGE:

To drain the ground in the neighborhood of the poultry buildings with tile or some such method may seem expensive and going to an extreme. But if tile and similar drainage of land is worth while for ordinary farming, then certainly it is warranted for such highly specialized farming as poultry farming.

Underdrainage means a warmer, drier soil, two considerations of the highest moment to soil on which it is proposed to "farm" poultry. Some hillsides and slopes ideally located for poultry keeping which the writer has visited are troubled in the spring only with excessive water. Careful underdrainage will successfully and permanently remove these conditions.



## FREE RANGE OR YARDS:

On most farms, the poultry is given free range and this is likely to continue to be the practice for many years to come. And provided the free range is a suitable one that is, one particularly where the poultry cannot have access to filth and foods unfit for them, or on the other hand where they cannot get at crops which they will damage, there is very much to be said in favor of free range. Free range has the merit of allowing the hen in a great measure to look out for her own well-being and in direct ratio as the range is constricted or taken away is the work of the keeper increased in an effort to "make it up" to the shut-in bird.

*It is a fact beyond dispute that poultry can be kept in the pink of condition and health in very small quarters.* But the price in labor and care is way beyond any returns the fowls can pay in pounds of meat or market eggs.

*Again, it cannot be successfully denied that hens will not lay as many eggs in shut up quarters as on free range.* In fact, the writer is persuaded that at least for a season they will lay more eggs. Shutting in strong, free range poultry acts as a stimulant and under pampering care such will quickly and strongly respond.

However, merely shutting up hens and throwing down a lot of food will not bring about the conditions of the two previous paragraphs. Not by a hundred miles. Hens closely shut in to stay in good health and yield a maximum number of eggs must be coddled and waited on like so many invalids. There is no real profit in this if time is of value, and a body must have the patience of a Job and be "crazy" on hens that will be content with this kind of poultry keeping.

There is one sort of intensive or shut-in poultry keeping that is practical and may be extremely profitable. Bringing in off the range in fall, large, strong, early hatched pullets, about ready to lay and giving them that care and attention to cause them to lay. Thus handled they are sure to lay a great many more eggs than if allowed at liberty and if simultaneously with the opening of spring (if well cared for, hens seem to bear confinement very easily during our Northern winters) they are restored to free or to a large range they will suffer little from loss of strength and vitality. Yearling hens can be treated after the same method. But, as stated in a previous chapter, hens or pullets intended as breeders should not be so handled. Because, in the end it will result in loss.

No matter how we care for or handle a hen in close year-round confinement a diminution of the vital forces will show in her offspring and each successive generation of "shut-ins" will be weaker, will lay eggs that hatch poorer chicks that are harder and harder to raise and adults that will give a poorer and poorer account at laying.

*Summed up, free range the year round guarantees healthy poultry, needing the minimum amount of care and paying the biggest profit on the labor involved.*

Only the range wants to be different from that which many farms afford. A great deal of adult farm poultry is suffering a negative harm from free range; or doing a positive harm as a result of same.

Wherever possible the poultry should be colonized in the orchard or in some fields used for pasture only. If yarded the yards should be so large as to guarantee a liberal amount of grass growing therein year after year.

The system of having a yard on both the north and the south sides of the poultry house, where it can be adopted, is a good one. The north yard being cool in summer should be used during that season, while the south or winter yard is thoroughly cultivated, limed and put back into heavy sod. As a grassed yard is above all other things desirable, a great deal of effort should be made to keep a good sod. A yard in grass is usually a yard free of soil taint or contamination.

One of the reasons grass so quickly disappears in a small narrow yard or pen is that it is *worn out*. For instance, a pen 20 feet wide by 100 feet long with forty or fifty hens will be bare usually in a few weeks. Now, if the same number of square feet of yard, in this case 2,000, is put into a yard 40x50, or into approximately a square yard or pen, the grass will last every much longer; or, if the hens can have two such yards, with some management, they can always be green. However, a yard or park ("park" conveys a better idea of what an ideal "pen" for chickens is) two or four times this size, according to the variety kept and the character of the soil, etc., is nearer right. (See Plans 6 and 7).

One hundred square feet per hen is none too large if the yard or park is to stay sweet and in sod, and is not only a suitable and economical range for a hen, but an attractive and sanitary one as well. The larger the park or the nearer to free range the better. If large, and during the fast growing months the grass gets ahead of the chickens, a sheep or two in each pen will be better than even frequent mowings.

A brook or running water is something to be prized and other things being nearly equal the yard or yards that can include same are the better.

For shade, plum trees do best in poultry yards and can be made to furnish shade almost as quickly as the fast growing peach. Peach trees, if cultivated occasionally so as to help the hens keep the soil mellow as far as the branches reach, make a good shade, and a profitable proposition besides.

Quick and permanent shades for poultry yards is secured by preparing a small bed at one end or in one corner and planting artichokes. These need never be replanted. Appear every Spring. Make a good shade and of the sort poultry likes. Die down in the fall and are out of the way during the winter season. The rough, hairy leaves remain untouched by the hens, usually even after all else green is gone. Winds and rain storms do not blow them down. Sunflowers are not to be mentioned with artichokes for poultry yard planting. Privet set out in clumps is very quick growing; makes a shade liked by poultry and with a little care may be very ornamental. With privet or artichokes the poultry will not learn to fly into trees and perhaps over fences.

The larger the yard the lower may be the fence. One Leghorn farm I know of use four-foot fences entirely and have no trouble. With a small yard a seven-foot fence may fail to hold Leghorns. The best fence for poultry parks or yards is wire. If wire netting or so-called poultry netting is used no top or bottom rail is necessary.

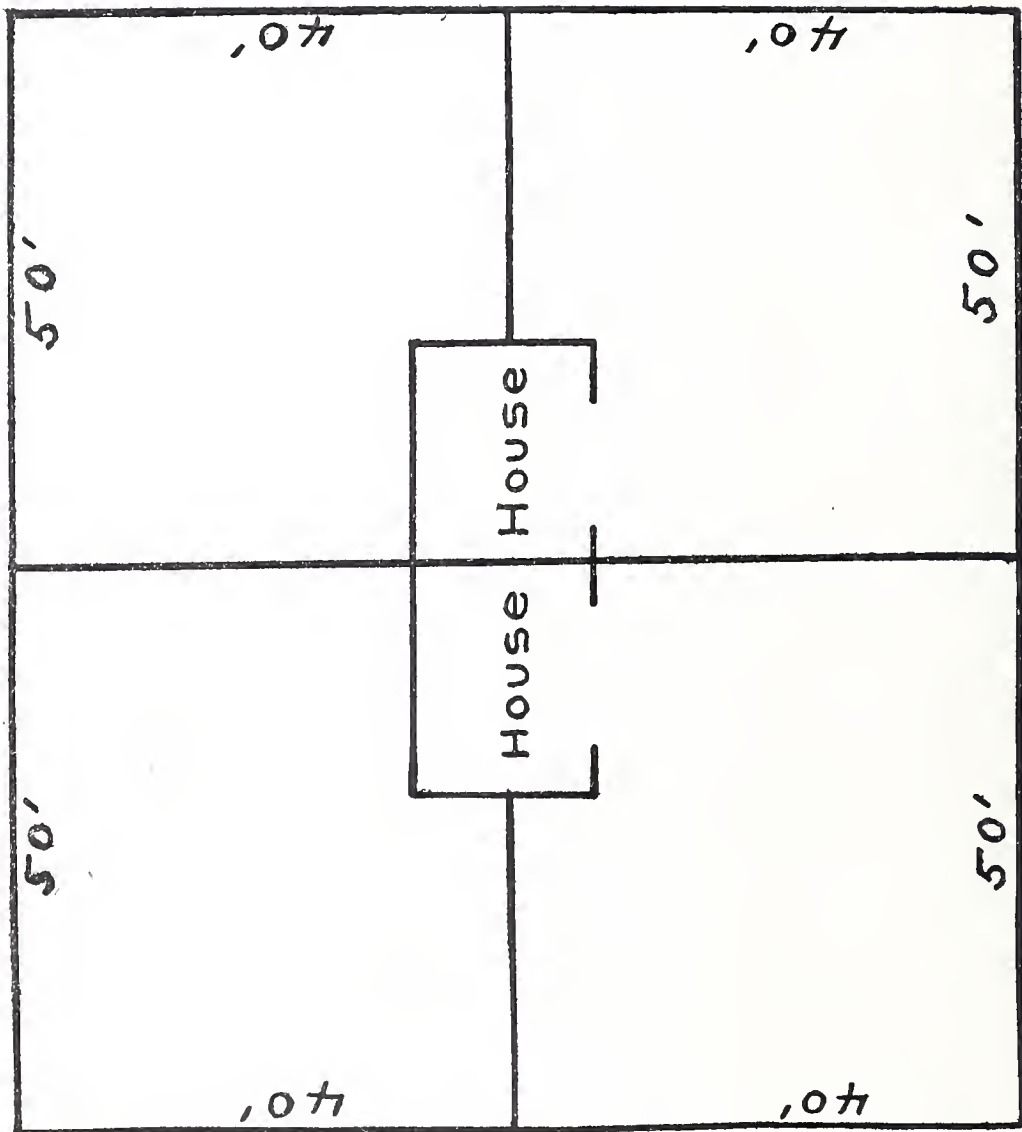
100'	20'
100'	20'
100'	20'
100'	20'

Plan 6. Narrow yards 20' x 100' are usually soon bare when carrying even moderate sized flocks. This is to a great extent due to their shape.









Plan 7. Square yards, approximately 40' x 50' with house in middle. Such are cheapest to fence and surest to stay in sod.

A better way is to brace end posts very firmly and then stretch very taut a top and bottom wire of the usual telegraph wire diameter or gauge. The poultry netting can be tied to this or wired to it with short pieces of soft copper wire. If five or six foot height is used a center strand of wire should be added. In this way poultry netting will make quite a fair fence. However, there are at least several makes of "poultry fencing" on the market that are a great deal less bother and expense to put up and will last longer and look better.

#### YARD CONDITIONS AND CLEAN HOUSES:

If a yard is bare and has been thus for several seasons, nine times out of ten the poultry therein has ceased to be profitable. For some reason or reasons, not fully or satisfactorily explained, poultry does best on new ground. As new ground is manifestly out of the question in most cases after poultry keeping has been once established, every effort should be made to so handle the poultry and the soil and the crops thereon that the ground will remain nearest the ideal or, nearest to "new" soil. To take care of the soil so that it may remain sweet and in best possible shape to carry poultry is alas! very rarely done or even thought of.

On free range it is true that very little attention need be paid to soil contamination, and yet, owing either to a wrong site or pure carelessness or laziness, the soil in the immediate vicinity of many poultry houses with free range poultry living therein is often in a very bad shape. The breeding place and starter for many poultry diseases.

Right here (for it will bear repeating) warning is given that chicks at least should have yearly, new soil to grow on. If they cannot for any reason be moved on new soil, new soil should be moved to them.

The matter of clean houses is often overdone. A "clean" house is one full of sunshine, fresh air and light, is free of dust, is given an inside coat of white wash once or twice a year or a coat of cold water paint every two or three years, and has the droppings removed at least once a week and the litter once a month.

Air-slacked lime, disinfectants, liquid lice killer, etc., are not needed. Nor is it necessary to remove the droppings every day or be fussy with cleanliness. If the house is large for the number of hens therein, at least at certain seasons of the year, droppings removed once a month and litter once every few months will be sufficient.

One of the great advantages and economies of the wide open, flooded with sunshine, properly built house is in the saving of cleaning labor. Another, is the allowing of heavier stocking.

Many people will prefer the cold water paint for interior use to whitewash. It lasts much longer, is easier and cleaner to put on. Don't rub off and looks better. Does not cost any more than whitewash, if these things are taken into consideration. Is just as sanitary as whitewash, for once whitewash is thoroughly dry I doubt if it has any antiseptic properties left.

If red mites (commonly called lice) get into the house or any contagious disease, the easier and better way than the whitewash brush or the crude petroleum or other nasty spray, is to close up the house tightly and evaporate on a small oil or alcohol stove from a half to three-fourth cup of formaldehyde. Simply pouring this quantity in

a tin or old pan, setting on the lighted stove, for a house 12x20, and quickly retiring, will, in the course of a half hour, kill every germ and every living thing in the house. Even the eggs should be removed from the nests as this poison is very powerful. Care, of course, should be used in handling it this way. The house may remain shut tight for several hours and should be thoroughly aired before entered by man or chicken. The best results are obtained, from this method of turning formaldehyde into a gas or vapor, only on warm still days.

This method of ridding a poultry house of lice or disease germs is simple, sure and in-expensive and very clean as compared to using liquids.

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## TABLE EGGS AND EGG YIELDS

### FRESHNESS ONLY ONE PROOF OF QUALITY:

*Most people who buy eggs for consumption have only one test as to the goodness and quality: freshness.* But already, with better knowledge, a change from this standard is coming about and a discriminating public is demanding other things besides freshness in their table eggs. The producer that will cater to this trade can readily secure a premium way above ordinary market price. There are millions of eggs marketed that even though it had been possible for them to have reached the consumer while yet still strictly fresh that yet, by no means, were of first rate quality.

Meat is sold by its quality. Different carcasses bring different prices although slaughtered same day and hour. Butter is of many prices with freshness presumably not questioned. Yet meat and butter spoil and show age just as quickly as eggs. So it has come about that in eggs, lack of freshness is made to cover a multitude of other shortcomings, even though many of these latter or all of them, by most buyers is charged to the former.

There are eggs laid daily that are not fit for human consumption even when new laid. For instance there are still farms where the poultry has access to the privy and feed there during the health and sickness of the humans living on the place. There are consumptives or farms whose sputum is picked up and swallowed by laying hens. There are hens living on the filth of the manure pile and the pig pen. There are hens suffering from vile diseases. There are hens fed on slops, mouldy feed and garbage; in some village and town back yards wading in inches of this filth. If milk from garbage fed cows is unlawful there is a reason and such food is no better for laying hens than for dairy cows. And if food is turned by the hen into blood and from the blood the egg evolved it is not nice to know that hens under these conditions are laying eggs. And few people knowing their origin would want to eat them although strictly new laid.

*It is high time that we are more particularly about these things. If we are not we will have state and government inspection of poultry and poultry products and of all places producing same.*

What has been said so far is not for the purpose of belittling freshness in eggs. Freshness will always remain one of the prime requisites of good table eggs. The amount of eggs lost or partially lost yearly for the reason that somehow, with all this hue and cry





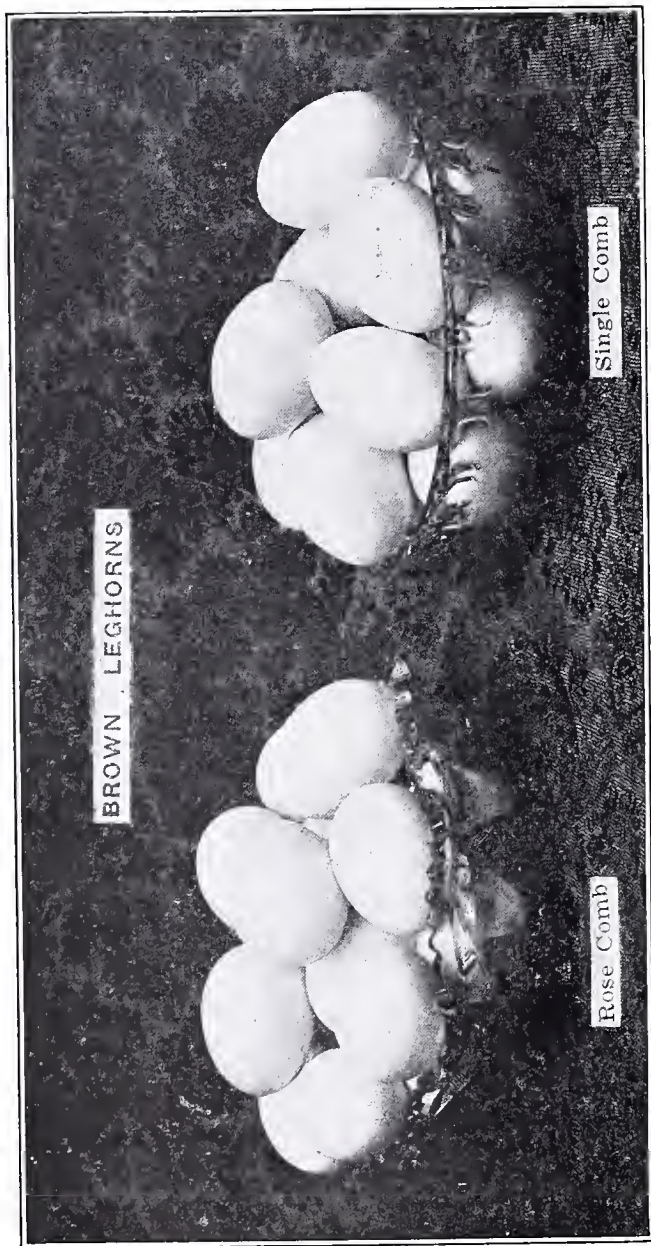


Fig. 12. Exhibit of eggs laid by Rose and Single Comb Brown Leghorns. These eggs weighed 33 and 35 ounces per dozen respectively. Courtesy of Mr. W. W. Kulp. Exhibits of eggs should be a feature at every county agricultural fair and at every poultry show. If a fair amount of premiums are offered and the table egg department is properly advertised to give it a start, it will be found easy to get a good display and that many people will be keenly interested in studying the exhibit.

and emphatic demand for "fresh eggs," we have not yet learned to get the vast bulk of eggs promptly to the consumer, is simply enormous.

Already there has been legislation in most states regulating the sale of eggs that have deteriorated, and can no longer pass as fresh eggs. In some states at least the buyers have got together and will no longer take eggs case-count but insist on buying loss off, thus compelling the producer to stand the loss. However, it is a fact that lack of freshness is due more frequently to delays in reaching the consumer after the eggs have left the farm and the producer, than to any delays while in his hands.

As it seems everyone knows the value of freshness in eggs and more particularly because lack of same is only one of many reasons why eggs are not up to mark, a great deal will be made in this chapter of some of these other things.

#### BEAUTIFUL, CLEAN, SANITARY TABLE EGGS:

A really first class egg for human consumption is laid by a hen in the pink of health, fed on a correct, or if you will, on a balanced ration for egg production, with access to plenty of cold, fresh water all the time, with clean yards and houses so her plumage and particularly her feet may be clean, with the care-taking such, that she can not get any spoiled or filthy food, with no male present, with a clean nest, with the egg gathered as promptly as possible and removed to a cool, dry place free from any odors or mustiness, with a care-taker whose hands are scrupulously clean while handling eggs, with that package guaranteeing not only safety against breakage, but against contamination of any sort, and that is attractive, and finally with a positive assurance, that the egg will reach the consumer quickly.

Such eggs (Fig. 12) are good to look upon and open up beautifully, and besides, are eggs that are "meaty" or contain a maximum of food value. They carry a "bloom" on the outside and open up with the albumen and yolk in splendid shape, that is a pleasure to the expert or to the one that knows the difference between such and

#### THE OTHER KIND:

The common egg for sale in all large cities particularly at all seasons of the year is so fully open to suspicion that all careful housewives and cooks open each separately into a saucer before using. This egg is often the only kind to be had at any price and frequently when some nice eggs are wanted for a sick person, store after store will be tried in the effort to get a few first grade eggs.

This is a peculiar condition when the total value of the eggs laid in this country yearly is given at \$600,000,000.00. We are told that \$45,000,000.00 are wasted each year because of breakage, blood rings, rots, spots, etc., and that this is a conservative estimate. It would seem that even with this tremendous subtraction that there should be more first grade eggs in the market, and the fact that they are not should set every reader of these lines to thinking and to resolving to do his tiny share towards righting a condition existing in one of the most indispensable and largely used of human foods.

## WHERE THE CONSUMER IS AT:

The consumer of the vast bulk of the annual number of eggs sold has up to this been largely helpless. In the large cities and even the small towns he has to be satisfied with such eggs as were offered. He has acquired the habit of asking for "*fresh eggs*" and been well content if he was persuaded he got them. On the other hand, he frequently gets the other kind and will bitterly complain that six, nine or even every one of his dozen were bad. The one hope of the consumer getting better eggs or all good eggs is to make every effort to buy them direct and to encourage and uphold everything looking towards the desirable condition of bringing the buyer and the seller of all American grown food commodities closer together.

## FROM PRODUCER TO CONSUMER:

The producer of good table eggs who may wish to sell his product direct, at present has a pretty rocky road to travel. Ordinarily, customers will object to paying for *good eggs*, insisting that an egg is an egg. I have known buyers of table eggs within the same five minutes give a hard luck story as to the condition and quality of the last dozen of eggs they bought and object to paying an advance price over such eggs for good eggs.

The easiest solution of the problem of marketing eggs and obtaining premium prices for the large egg farmer of a great section of Pennsylvania has been to produce White Leghorn eggs exclusively and ship them to New York City. But the small producer must find another way and fortunately there is another way, if some fair sized town or large city is near at hand.

If there is a local daily paper the easiest way may be to present editor and business manager with a basket of the real thing in eggs and explain to them the difference in quality, in freshness and in food value of such eggs as against ordinary market eggs. This may evoke a free reading notice but it is safest to insert a small, well written advertisement, to appear conspicuously for several days or weeks.

Another way is to call on several of the leading practicing physicians armed too in every case with a small but choice basket of sample eggs. Physicians, with their knowledge of sanitation and a full appreciation of the value of clean and sanitary food products, will usually prove ready listeners and will only too cheerfully accept commissions to recommend eggs that they know to be reliable, to their patients.

The third and perhaps the most dependable and certainly the most direct method of opening up a channel from producer to consumer is to have some neat business cards and small, plain or folded circulars printed. Armed with these and with a basket of sample packages proposed to be used, a house-to-house canvass of the better residential sections of the town should be undertaken. The business card is likely to make a better impression, if besides the owner's name it carries an attractive farm name. In every case it should bear in addition these words or their equivalent:

"Clean, dependable, and new laid eggs. From farm to table direct."



## STRICTLY FRESH LAID EGGS

Guaranteed non-fertile and absolutely sanitary and of especially fine flavor and quality.

From W. THEO. WITTMAN,  
*Allentown, Pa.*

Label used by the author in marketing eggs.

The circulars should have some "startler" as a head-liner, so that a reading may be guaranteed. One that I have known to be used read something like this:

"Quit eating stale eggs and wasting money buying that kind."

Another that turned the trick effectively read: "Most of the eggs that you buy are neither fresh nor clean. Robin Farm eggs are both."

The body of the circular should tell in short but convincing sentences the difference between the ordinary unreliable, unsanitary store eggs and the eggs that the farm undersigned is producing and offering. It should frankly explain why a premium of 10 cts. a dozen over store price is asked, and why they are worth it; hints of which are given in this chapter, and other that will occur to the farm owner. Particular stress must be given to a notice that fair weather customers, or customers that will stay only so long as eggs are scarce, are not wished and that the extra price is charged not because eggs may be scarce at certain seasons but because, by reason of proper feeding, housing and cleanliness there is a guarantee of always high quality and freshness.

A clincher for this sort of circular is an invitation to visit the farm and see the stock, the houses, the nests, the feeding and the scrupulous cleanness and care taken in the handling of the eggs. In such cases it may be wise, however, to expressly stipulate that visitors will not be welcome Sundays or if accompanied by children or dogs. These three things in visitors can be unmitigated nuisances and a source of great deal of loss in the yield of eggs.

## PACKAGES, MARKETING, SELLING PRICES:

That packages for such a delicate and easily spoiled food should be in all cases, clean and attractive, goes without saying.

One of the biggest egg farms in the country uses new cases only and to protect these in transit they are wrapped in paper. They prefer this to putting eggs up in separate dozen or two dozen cartons and they have a trade that prefers them so. However, even though each case is prominently stenciled with the day, month and year packed, there is some danger that under this method the case may when refilled be sold over again as such and such farm eggs.

The best way discovered to date seems to be to use the paste-board boxes holding one or more dozen each, manufactured and for sale in various styles. This has proved a very popular method of packing and marketing fancy table eggs. So much so that lately unscrupulous dealers have invented wholly fictitious "henneries" and having printed

same on these kind of packages, have filled them with candled eggs from ordinary stocks. Probably the only way to fight these impositions is to use either a better or finer package than these parties will use, or to use a label or seal stating distinctly that the eggs within the package are guaranteed to be from a genuine and not fictitious egg farm, if seal is unbroken.

A very attractive way to market eggs where it is possible to deliver direct from producer to consumer, or to consumer through the medium of a first-class grocer, is to use ordinary five-pound grape baskets, Fig. 13). The bottom of these should have half an inch of fine excelsior and the basket then lined with squares of thin wrapping paper about 12x20 inches, allowing the edges to project beyond the edges of the basket. For white shelled eggs pale pink or blue and for brown shelled, dull green or dull purple paper should be used. These baskets will just hold two dozen eggs and as both basket and paper are very inexpensive, and when filled are immensely attractive, they make a desirable package.

One of the reasons that eggs reach the consumer with a taint to them is, that the fillers and straw-board flats of many egg cases are soiled, and ill smelling. Such should, under no circumstances, be used. It is equivalent to packing butter in a dirty or foul smelling tub. Storing egg cases in a cellar or other damp place is also an abomination and there is just as much occasion for washing and sunning such, as there is for doing these things to milk pails, etc.

Our whole present system of marketing eggs will have to be revolutionized if eggs are ever to reach the consumer in the condition they should. The trouble begins with the main producer, the farmer, who often is not only extremely careless as to when and where and how often he gathers eggs, but as to where he keeps them or how long he holds them. Often they are held until such time as the market town may be visited or until enough have accumulated to make it worth while. This may sometimes mean a matter of days, but more often may be a matter of weeks. Or they may be held even months waiting for high prices. In summer like as not the holding place is some damp and musty cellar; in winter either the same cellar plus the odor of decaying vegetables, or else an over-heated and under ventilated kitchen cupboard.

*Not all farmers are careless and indifferent as to how often the eggs are gathered and as to where they are kept or how long they are held, but enough are to cause a loss of millions of dollars annually in eggs that eventually turn out to be unfit for food.*

In marketing eggs, there are three kinds that should be left at home or used at home, viz; all dirty eggs, all thin-shelled or cracked eggs, all small, misshapen or overlarge eggs.

Eggs that have become fouled or dirty are always poor keeping eggs, and there is not one chance in a hundred that such an egg will reach the consumer as a good egg. If nests are filthy, that is, if the nesting material is old, or dirty or damp or musty (it often is all of the three latter at the bottom, even if the top looks fairly clean and sweet), or when the nesting material is merely dirt, dust and manure, eggs laid therein are bound to become dirty in the sense that they will quickly, at least in summer time, become infected with bacteria



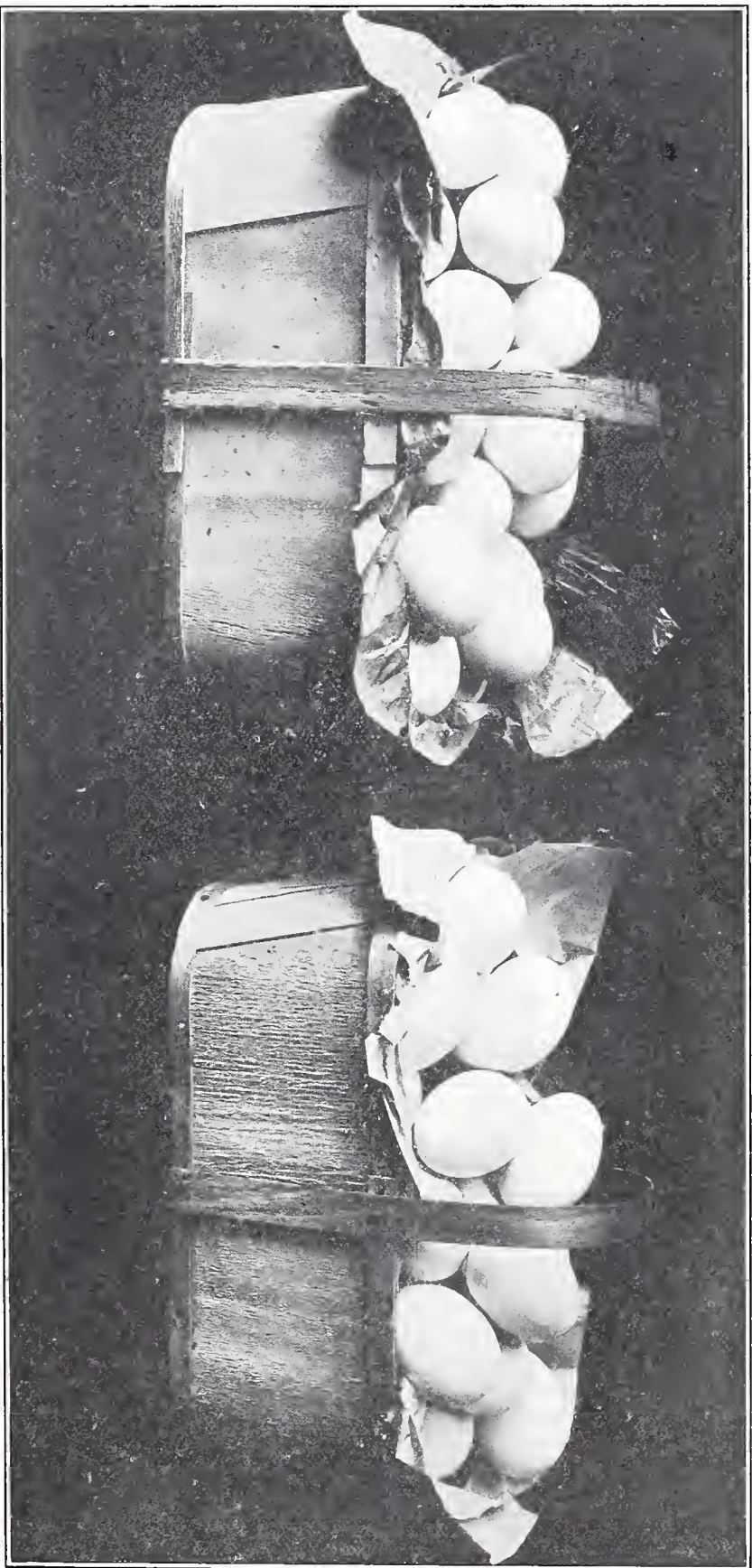


Fig. 13. An attractive way to display or market eggs in a local market. These are simply ordinary small grape baskets lined, for white eggs with pink or dull green thin, cheap wrapping paper or for brown eggs with white or dull green. The value and the worth of an attractive package is too well known to need enlarging on here. These baskets will hold nicely just two dozen eggs.





that, in the time elapsing between nest and table, are likely to multiply into millions and eventually cause the egg to become utterly unfit to use.

*Or again, how can an egg possibly be a clean appetizing breakfast egg, if the hen that laid it went on the nest fresh from the manure pile and pig pen and with feet laden with filth fresh from such and even worse pest holes.*

During wet, rainy days hens will often go on the nest with muddy feet, soiling their own new-laid eggs and perhaps others laid there by other hens. This too should be guarded against. In fact, there should never be any muddy soil in the close neighborhood of the poultry house, not only on account of possible soiling of the eggs, but for reasons making for the well-being of the poultry.

*Eggs going to market should never be washed or wiped even with a wet rag.* In farm houses where neatness and cleanliness are esteemed next to godliness, and we have many such in Pennsylvania, the writer has known it to be the regular thing to wash or wipe every egg before being sent to market. And yet nothing could possibly do the egg a greater harm.

The shells of eggs are very porous, and the only protection they have to the ready access of all manner of germs and bacteria is the so-called "bloom." If eggs need any slight cleaning it should be done at the dirty spots only and if possible with a dry rag. Water, warm water particularly, will moisten the membrane right under the open, porous shell and make it a feeding ground or entrance gate of bacteria and germ life into the contents of the egg itself. Besides, dampness is conducive to the rapid development of moulds and spots in eggs.

The carelessness or indifference, or perhaps ignorance in the great waste of market eggs is best exemplified by the vast number of thin-shelled and cracked eggs sent to market, as this is a condition most easily avoided or prevented. Some eggs are always used at home and such eggs should always be the first to be so used. Or if there are too many (there should be comparatively few; too fat hens and too few nests or no readily accessible form of lime in the shape of crushed oyster shell, are mostly responsible for such eggs) they should be sold near-by where they will be at once consumed.

A cracked egg in an egg case is not only usually a loss outright, but when breaking, soils often times filler, straw-board flat and case, which decays and moulds and taints successive eggs that follow.

Thin-shelled eggs by the time they reach market are usually in the class of cracked eggs otherwise known in the trade as "checks" or if cracked so badly as to be leaking, as "leakers" and have to be candled out and sold at a loss at once, or else run into cans and frozen for bakers trade, again at a much reduced price.

*To repeat, no cracked or thin-shelled eggs should ever be allowed to enter the regular channels of market egg distribution, but should be used at home or sold locally where they may be at once consumed.*

Small, misshaped or overlarge eggs should be thought of in the same class as "checks" and "leakers"—they should never be started for the market. One such egg in a dozen spoils the appearance and the selling value as much as a half bushel of culls in a barrel of fine apples will lower their value and appearance. Our farmers should

take as much pride in having their eggs up to mark as they do in having their apples and potatoes and wheat carefully sorted and cleaned.\*

The practicability of the policy of co-operative marketing of eggs can not be questioned. Put into common practice it would be an efficient method of greatly increasing the average return to the producer.

Perhaps all of these practices have gone along because of the faulty method in which all eggs have heretofore been accepted and paid for on the basis of the dozen and "case count" method. It has been perhaps the one big reason for the growing big difference between the selling prices and the paying prices. Due partly to the demands of the trade and due partly to the more and more stringent construction of the pure food laws and special laws enacted, governing the quality and sale of eggs, all eggs passing through the hands of dealers, which is practically 100 per cent. of eggs used in the larger cities, are "candled." Candled eggs are eggs tested by holding each and every one before a strong light, shaded to pass the light through them, thus to strongly show up the contents. Originally this light was probably a candle,—hence the term. 16 candle and even higher power incandescent lights are now commonly used. Egg candling is a distinct trade and employs many men who become very expert, being able almost at a glance to classify eggs as "rots," "spots," "blood-rings," "floats," "checks," "watery," "weak," "seconds," and "firsts."

But as the demand for good eggs is insistently increasing the old methods of paying low and risking the loss are no longer satisfactory, and hence has arisen in some states the "loss off system of buying." Under this system the loss is placed where it belongs. In other words the producer marketing poor eggs realizes a poor return, while the producer marketing good eggs realizes a good return. Or again, an egg is no longer always an egg. Bad eggs are left on the producer, or he gets no pay for same; and touching him at a sensitive spot the solution of this millions' of dollars worth of waste of eggs is in a fair way to be solved.

#### THE WASTE OF FERTILE EGGS:

Probably the one biggest reason why eggs deteriorate and spoil is because the vast bulk of eggs laid are fertile eggs. This is entirely different from what it should be for there is nothing gained and much to lose by having males running with laying hens. The popular notion is that a flock of hens large or small should have one or more males running with them. No one can give a good reason for it. It has always been the custom and unthinkingly nearly everyone keeping hens has followed custom.

*Careful observation has satisfied a great many poultry keepers that hens will lay many more eggs without the presence of males.*

Hens certainly become a great deal tamer and easier to handle when the jealous, watchful and easily alarmed male is absent. When on range or when as a wild fowl, these traits of the male were a necessity or were useful. When yarded or when under the care of a keeper there is no use to feed any drones of this type. Without males, especially in the heavier breeds, the females are never injured

\*Note.—Hens laying such eggs should be got rid of. Extra large hens for their variety can safely be suspicioned of laying the too small eggs, and over-fat hens laying the mis-formed. Simply cooping such separately when in full lay will prove their guilt or innocence along such lines.





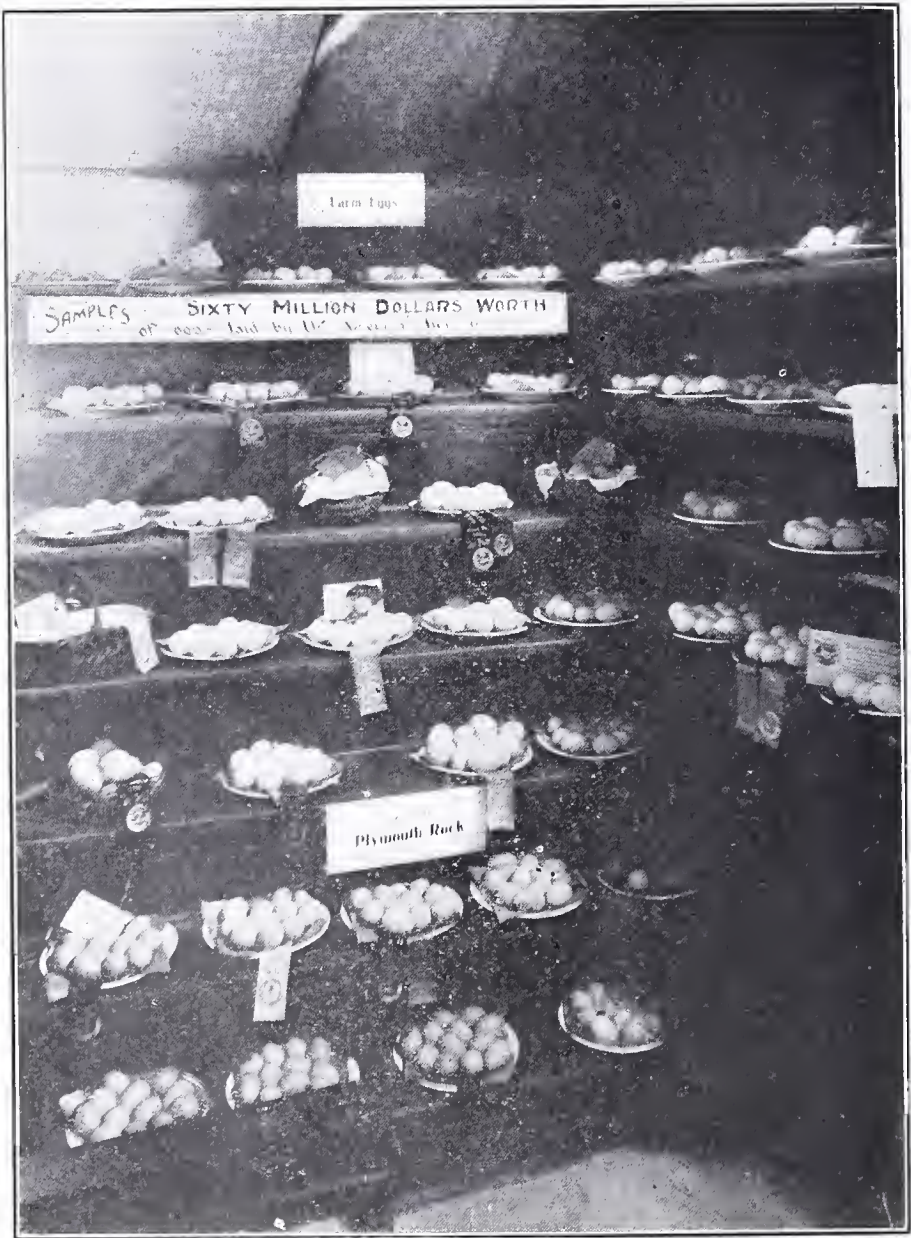


Fig. 14. Showing part of an egg display at a county fair (Great Allentown Fair, Sept. 1911.) There were eight classes for table eggs and eighty-three dozen were entered for competition. Not any other product of the farm on exhibition at this great fair attracted more attention. The booth and shelves was lined with some cheap stuff of a rich purple thus setting off the eggs to great advantage. (Note—error in plate—it should be 600 million of eggs instead of “60 million dollars worth.”)



or lamed; their backs are not torn and they retain their plumage unbroken and unsoiled, adding to their appearance, their health and their content.

But the one big damage the male does is putting into that superbly concentrated package of one of the finest and best of human foods a principal that under many conditions is bound sooner or later to spoil or destroy it. Incubation may begin at as low a temperature at 90° and many warehouse rooms, many depot platforms and many railroad freight cars under the influence of a hot summer sun will range from 100° to 110°.

Is it any wonder that it is believed that the great mass of blood ring, heated, and rotten eggs that are discarded under candling or that are thrown away by the housewife, is strictly due to the fact that the eggs were fertile eggs.

*When it has come about that the average city buyer of eggs has reached a point where he opens each egg separately into a saucer before using, it is time that the producers of eggs wake up lest the trade in eggs be enormously damaged.*

In midsummer, too, many hen houses reach at least 100° with more or less eggs in the nest awaiting collection. Or, even with a lower temperature half a dozen eggs laid by as many hens means as many periods for the eggs to be warmed up to the heat of the hen's body—or the incubating point. Is it any wonder there are so many spoiled eggs? The wonder is there are as many good ones as there are.

An egg that is infertile rarely offensively rots and will, if otherwise a sound, healthy egg, stand quite prolonged high temperatures without much change. Unfertile eggs that have been in incubators until the fifth or seventh day are regularly sent to market by many egg farms, they claiming that even after a week's incubation they are still likely to be superior to the average run of fertile market eggs. Some of these men go so far as to use them regularly in their own families, demonstrating their belief in what they say. A great many others boil them and feed to baby chicks.

Males should be confined away from the females all but during the time eggs are wished for hatching. This time can profitably be restricted to a period of six to eight weeks and further restricted to selected matings. Thus, doing away with any necessity for selling for consumption any egg containing fertility.

Whole carloads of heated eggs and blood rings due to exceptional hot spells have within the last few years been condemned in the big cities and been destroyed. There is no way for the buyer, be he collector, jobber, retailer, or consumer, to tell a fertile egg from an unfertile egg, hence it remains for the producer to right this greatest of all economic wrongs in the marketing and sale of eggs.

*It may be a little early to make such a prediction, but the time is surely coming when it will be unlawful to sell to the market, eggs that are fertile.* Such a law will of course be impracticable until we have compulsory inspection of poultry, poultry products and poultry plants similar to the inspection we now have of the dairy and dairy products. With a product closely rivaling in value the product of the cow and one just as commonly and largely used and one about whose

purity and cleanliness and fitness for food there is more complaint about, there is just as much use for and necessity for inspection of the hennerly as of the dairy.

#### THE WASTE OF DIRTY EGGS AND DIRTY NESTS:

The condition of most nests in a great many poultry houses and farm buildings from which eggs are sold for human consumption is oftentimes such that "inspection" would be a blessing. Nor are dirty nests entirely due to carelessness. On one farm visited, a dairy farm, every thing about the place was tidy and clean as a pin and the folks would have been aghast at the idea of shipping milk in cans lined with cow-dung and yet the hens on that place were daily laying nice, sweet eggs in nests that were half full of dirt, dust, and dried hen manure, breeding places for bacteria.

A first-class table egg should be spotless clean. (Fig. 14). Of dirt that can be seen and dirt that cannot be seen. The latter is often the worst of the two. A dirty egg may be perfectly fresh and if used at once be entirely clean and sanitary as to contents, but its appearance is against it.

Fortunately the man who has a good, clean article in eggs can readily realize the high dollar not only for his product, but for any extra pains he may expend in putting same on the market in first class shape and in attractive packages or methods. The Pure Food crusade has been a splendid educator for the great mass of the people and attractive, clean, bright eggs in attractive packages sell readily at fancy prices.

Some hens will lay a shiny white egg often slightly tinted; others a brown egg that is a muddy color. Such eggs should never be set, or better, hens laying such colored eggs should never be used for breeders, lest they perpetuate themselves. Such eggs never look clean or fresh, even if both.

#### COLD STORAGE EGGS AND COLD STORAGE OF EGGS:

Cold storage of eggs has been the great equalizer of prices and of supply and demand within the last decade, and as such has made it possible for untold numbers of our people to enjoy eggs and things made with eggs that otherwise they would have done without. The country at this period could not do without cold storage of eggs and were it compelled to do so for just one year, would entirely change its attitude towards the cold-storage egg.

*Cold storage does not spoil eggs, it preserves or holds eggs.*

The temperature at which eggs are held in cold storage is very low and usually too a cold storage or room for eggs means cold storage for eggs alone and nothing else, thus removing the only chance of contamination.

Cold-storage eggs are poor because they went into cold storage as poor eggs. And it is admitted that storage will not add anything to eggs. They come out as they went in. Give the cold-storage people full, meaty, clean, non-fertile eggs, in other words, give them eggs such as all eggs should be, and they will put out such eggs. Personally, the writer would rather accept an egg of the above sort even after a year or two years in cold storage as against the average heated, unsanitary, unclean, fertile and often watery ordinary market egg.

On the other hand, true it is that low temperatures do something to an egg that makes it quickly spoil after it leaves cold storage. It is helped along in this tendency by careless retailers and careless buyers who will keep eggs out of cold storage in a hot store room or kitchen. Of course, under such treatment, the eggs quickly spoil. It would be a miracle if they did not.

If the cold-storage people can solve two difficulties, the prejudice against their eggs must disappear. First, the getting of good eggs to put in storage. Second, the problem of getting them used promptly after leaving storage.

Whether the farmer or the big egg farm man has a complaint coming against cold storage of eggs is a question. *Whilst it is true that demand stimulates prices and production, it is equally correct to say that supply stimulates consumption.*

For about every 100,000 cases shipped in December, there are 1,000,000 cases shipped in April, and if cold storage did not take a vast quantity then, our farmers would at least for a few weeks, when they are getting the most eggs too, take 8 or 10 cts. a dozen as of yore. Eliminate cold storage and eggs would probably retail a dollar a dozen in mid-winter, but this would benefit the farmer but very little as he has no eggs to sell then. And where would egg consumption be at? And the average consumer?

Our legislatures all over the country are "barking up the wrong tree" in a large measure, when they pass indiscriminate legislation against cold-storage eggs. Some legislation towards helping the cold-storage people with their problems, would be more to the point.

#### OTHER METHODS OF PRESERVING EGGS:

There are various other methods of preserving eggs, most of them time honored relics of the time when it was believed that it was impossible to have hens lay in winter, and when the careful housewife of that time depended entirely upon her own larder to supply the needs of the family during the non-growing season.

The Chinese keep eggs for a century and consider, that like wine, they improve with age. Their method is very simple: The eggs are hard boiled and while still hot are wrapped in soft clay and stored away.

To the writer all home stored eggs taste alike, viz; not for any more. However, storing in water glass is by far the best. Followed by those kept in lime solution in a cool place. Only fine, full, firm-shelled Spring laid eggs from hens with grass run should be thus stored. In this way eggs can be had in midwinter with the rich, yellow yolks and heavy albumens of eggs of that season. Such eggs are a splendid substitute for fresh eggs in the baking of sponge cake, custards, etc.

A government bulletin gives the following methods of preserving spring and summer eggs for winter use:

#### METHOD NO. 1.

A solution composed of one part water glass (sodium silicate) and five parts of water that has been previously boiled. This was a very strong solution, and unless an egg was absolutely fresh it would not sink. The eggs from this solution were all of fairly good flavor and well preserved.



## METHOD NO. 2.

This was similar to No. 1 except that eight parts of water were used instead of five parts. The eggs in this were nearly as good as those in No. 1. This is a good preservative where it is desired to keep summer eggs for winter use.

## METHOD NO. 3.

This was composed of ten parts of water to one part of water glass. There was no bad eggs in this solution, but the eggs were inferior in flavor and in poaching quality to those kept by Methods Nos. 1 and 2.

## METHOD NO. 4.

This consists of the same solution as in No. 2, but in place of allowing the eggs to remain in the liquid, they were removed after having been in for a week, except the last lot, which was put into the solution. This lot was left in the solution for the remainder of the season. (a) The eggs, after being in the solution for a week, were removed and placed in an ordinary egg case in the cellar. They were all good when tested, but had evaporated considerably and were lacking in flavor. (b) These were the second lot of eggs to be placed in the liquid. They were handled similarly to those in (a) and were of about equal quality. (c) These eggs were allowed to remain in liquid. They were well preserved, all being good. They were scarcely equal in quality to those from No. 2 method, but were superior to those from No. 3.

## METHOD NO. 5.

A lime solution made as follows: Two pounds of fresh lime were slacked in a pail and a pint of salt was added thereto. After mixing, the contents of the pail were put in a tub containing four gallons of water. This was well stirred and left to settle. Then it was stirred thoroughly the second time and left to settle, after which it was poured over the eggs.

## RECORD EGG YIELDS, HOW MANY:

Many hens on farms are occasionally making record egg yields. That is, they are doing phenomenal laying. The laying may not last long but while it lasts it is a heavy one. Were it not that so many farm flocks of hens contain so many old stumps and spindling sapplings, many owners of same would be surprised to find that in the Spring season their hens were making close to an eighty per cent. egg record. And the poorer they have laid during the preceeding winter the heavier the yield is likely to be during the flood of spring time laying.

Such "egg records" are easy to explain. For one it is the natural season for hens to lay and second its the season of tender blades of grass and all manner of sprouting green things, and of worms and bugs, and the temperature and the very air seem to be favorable.

But to make a "record" egg yield at any other season, thinking particularly of the winter season, is a totally different sort of a problem. The poultryman has not yet discovered a system on a par with that of the dairyman when he wishes to show a big yield of



milk under test. He can, for instance, not blanket his hen, or is he "on" to any similar tricks of the trade. Some few years back a preparation was put on the market that actually did make hens lay wily-nily but the sad part of it was that very shortly the hen layed for the last time—laid down to die.

To make an "egg record" out of season with any one lot of hens (and keep the hens) they should always be confined to a roomy house without yard or outdoor pen. They must be carefully selected as to vigor and maturity, and in any but the Mediterranean varieties, be pullets. The feeding and handling must be exceedingly methodical and pains-taking, the objects being, first, to maintain high health—vigorous appetites—contentment and the utmost maximum of feeding. To this latter end a larger variety must be fed than usual and the feeding be more frequent.

Sometimes a rank amateur in poultry keeping gets a superlative yield, but the old-timer is satisfied if he can run the record so it will stand somewhere between 60 and 70 per cent. for months like November, December and January.

We have never had an official and hence thoroughly trustworthy laying test in this country. Such a contest would be extremely interesting. Teams or pens of birds entered for a week's record, the feeding and handling to be done by the owner. The Chicago poultry show this winter proposes to hold some such contest.

#### COST OF PRODUCING EGGS:

The cost of producing a dozen eggs is often inquired about, but will unfortunately always remain difficult to answer satisfactorily. At least until we have established by breeding more stability in the number of eggs hens will lay per year. When we have found the one best style of building for laying hens, this being a purely mechanical thing, we can construct such houses and such only. When we have found the one best method of feeding, and the one best combination of certain foods we can easily confine ourselves to such, and we can figure to a fraction, the interest on our investment, the cost of feed and the cost of feeding it. But there remains, the hen herself! Always bound to be somewhat of an unknown quantity and only if we could fashion our hens as we build our buildings, can we expect to be able to exactly figure the cost of a dozen eggs. It, therefore, behooves us by careful breeding to make our hens as near to order as possible. Under satisfactory laying, my experience would indicate that the food cost of eggs per dozen from varieties of the Leghorn family runs from 8 to 18 cts. per dozen. From hens of the various breeds of the American class (meaning Plymouth Rocks, Wyandottes, etc., and including White Orpingtons) from 14 to 24 cts. a dozen. The variation is due somewhat to the variation in the prices of food, and somewhat to the extent of the range and to the season of the year.

The cost of a winter dozen of eggs is necessarily higher than that of a summer dozen. A hen must not only eat to live, but she must then eat to keep warm. Again, the range North supplies no food at all in the winter.

## GENERAL SUMMARY:

The census of 1910 gives the total number of chickens *on farms* as 280,340,000 and the total value as \$140,170,000, or allowing the average value of a chicken as 50 cts. Besides the chickens reported there were 3,688,000 turkeys, 3,904,000 ducks, 4,432,000 geese, 1,765,000 guinea fowls, 2,730,000 pigeons and 3,444,000 colonies of bees.

For Pennsylvania the statistics show that the total value of all domestic animals, poultry and bees, was 141,371,000, or about the value of the chickens of the entire country.

Poultry was valued at \$7,674,000 a gain 71.2 per cent. in value since 1900. Gain in numbers 15.2 per cent. The summary on poultry shows that with 218,391 farms within the State, 205,158 were keeping poultry, nearly all of which number reported also as keeping chickens. The value of the chickens were placed at \$7,020,000 and the number at 11,895,903. Making the average value about 60 cts. and the average number to a farm about 68. 40,126 farms reported ducks numbering 163,777, valued at \$114,000; 13,300 reported geese numbering 46,318, valued at \$66,500; 24,025 reported guinea fowls, numbering 111,715, valued at \$48,200 and 6,161 reported pigeons valued at \$111,000.

Of the whole number of farms in the State, those reporting chickens numbered 93.9 per cent; turkeys 18.4 per cent.; guinea fowls 11 per cent.; ducks 10.8 per cent.; geese 6.1 per cent.; pigeons 2.8 per cent. and all other such as pea fowl, swan, etc., less than one per cent.

Poultry made the largest per cent. increase in value in the ten years between the 1900 and the 1910 census than any other live stock on the farms of the State.

And yet the largest increase in both number and value of the poultry has undoubtedly been among the village, town and city poultry people within this period.

*The census took no account whatever of this poultry.*

If there are some 200,000 farmers keeping poultry, there are certainly several times this number of people keeping same in the towns, and if the average size of a town flock is not as large as the farm flock the total number is likely to be as large and of as much value. Adding the two it is a fair proposition that the value of the poultry product annually in this State is about \$30,000,000.

*If each hen within the State could be made to lay only one more dozen winter eggs, at an average price of 33 1-3 cts. per dozen, the return would be yearly about \$3,000,000.*

Surely the study of "winter egg production" is worth the while and if this bulletin can help bring about even less than 1 per cent. of this yearly increase, its mission will not have been in vain. Or, if only one dozen eggs, at an average year value of 20 cts. per dozen, of each of the hens within the State will, as a result of the agitation for non-fertile and for more sanitary eggs, marketed in a more sane way, of which this bulletin is a small part, be saved, the author will be more than content.

Much therein has been left unsaid. Some statements might have been qualified or been made more explicit. None have gone in without due consideration, or that are not fully believed in by the author.

Some thirty odd years living with and studying poultry in its many phases as egg farmer, as breeder, as fancier, as judge, as man-

ager of a large poultry show, as lecturer and as writer, together with a full acquaintance with every part of this State and a greater part of the United States, so far as its poultry and poultry people are concerned, has given him chances to learn and observe beyond the ordinary, and he hopes he has fully appreciated the lesson that it is foolish to have your own way and fail when a better way is to keep on learning and win.

